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NOVEMBER, 19

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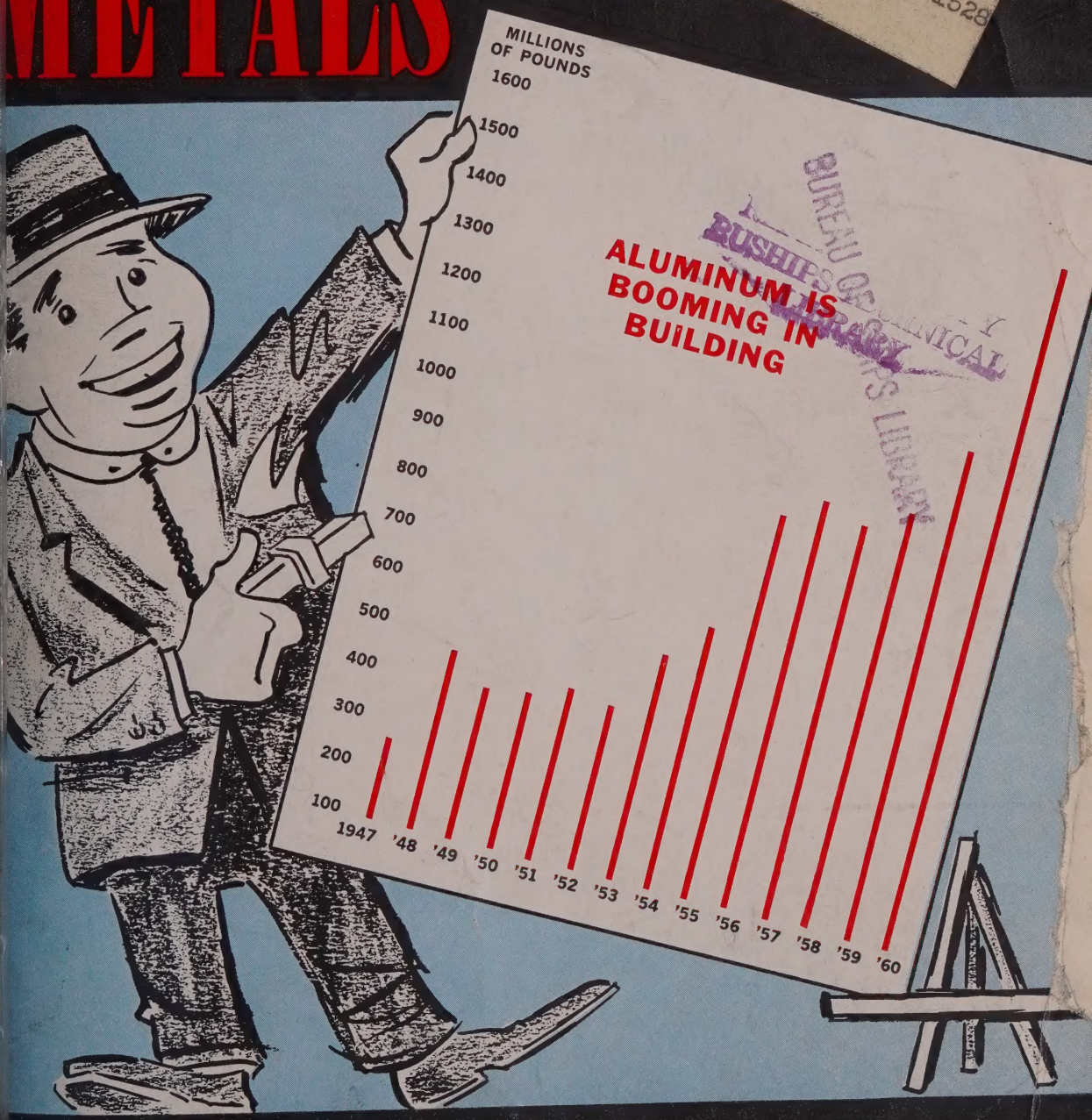

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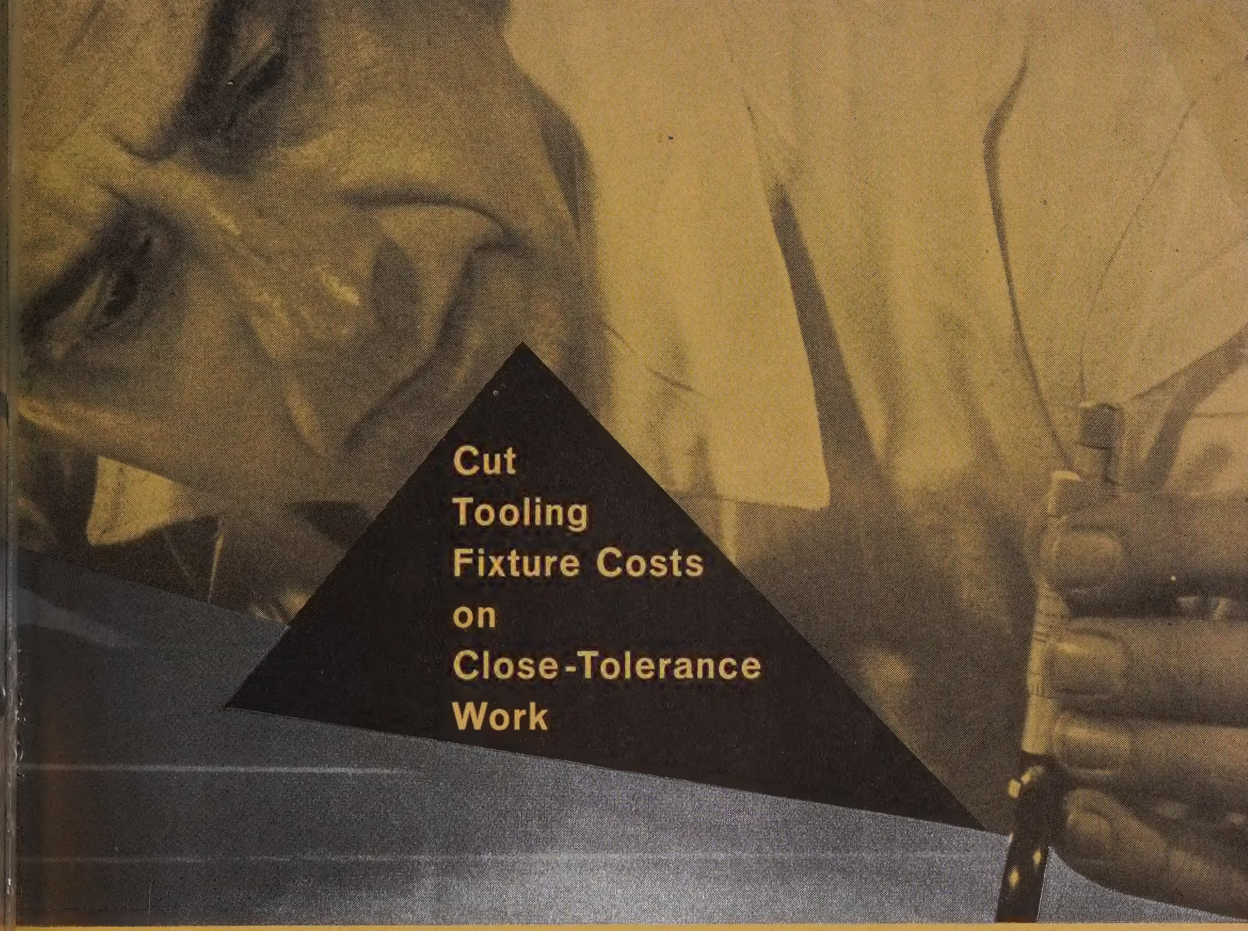

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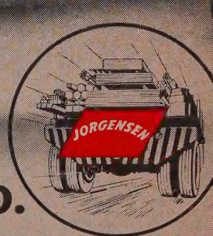

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N THE COVER: Shipments of aluminum all consuming industries should approach million tons this year — more than twice amount shipped in 1947. In the same riod, as shown on this month's cover aph, consumption of aluminum in build- and construction will have nearly adrupled if shipments to this industry ch the expected 550,000-ton total. Fea- es in this issue highlight some of the velopments that have stimulated this wth. All signs point to even bigger gains the coming decade.

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SENIOR EDITOR
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Modern Metals

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CONSUMPTION OF ALUMINUM IN BUILDING — F. L. Church — **32**
It has quadrupled since 1947, but even greater growth is forecast for the next decade. Use in all types of building should hit 750,000 tons next year; 800,000 tons may go into new home construction alone by 1965.

KAWNEER GEARS UP FOR RECORD SALES IN '60 — H. K. Darby — **36**
Big maker of aluminum architectural products revamps production facilities for bigger volume next year.

NO GLARE ALUMINUM SCREENING — **42**
Conversion coating upgrades aluminum product; licks "shiner" problem. Big maker of screen cloth grabs head start in trend to color with "screening of the future."

PORCELAIN COLORS SANDWICH PANELS — J. T. Gartrell — **46**
Advances in enameling methods and frits for aluminum expected to spur use of the metal in sandwich panels for interior and exterior building applications.

BRITISH SYMPOSIUM ON ALUMINUM IN BUILDING — **52**
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Clear, colorless coating shields them against staining and abrasion during shipment and construction.

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EXPANDED ALUMINUM SPANDRELS — **86**
Gray anodized expanded aluminum panels are a major decorative feature of new Time-Life Building; establish new design approach for aluminum in architecture.

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Letters

Suspension Castings For Power Lines

Sirs:

We are regular readers of your periodical and find it most interesting and enlightening, particularly regarding "the shape of things to come" in the use of aluminum and this makes for very stimulating reading.

We note in your "Letters" column for September that "C" of Michigan wishes to secure castings to be used in the suspension of high voltage electric power lines. We would be interested in investigating the possibilities of producing this item under license in Great Britain, or some other arrangement whereby we could take over the manufacturing rights. We feel we could convince the power generating experts in this country of its advantages, and we would be pleased if you could put us into touch with "C" of Michigan.

"A"—England

MM—We have forwarded your letter to "C"; hope you can come to some arrangement.

How To Clean And Finish Aluminum

Sirs:

Will you please send us 25 copies of the reprint, the 36-page manual "How to Finish Aluminum" which you feature in your September issue. These will soon be available at 50c a copy, you state. Please bill us.

"O"—Illinois

Sirs:

Thanks very much for your letter, in reply to my letter of October 28th, 1959, regarding fifty copies of the September issue of Modern Metals.

Actually, I was only interested in the 36-page section on "Finishes for Aluminum." You may use this letter as authority to ship me 50 copies of this at 50c per copy. Please invoice me directly.

"B"—Ohio

MM—While we had high hopes for acceptance of this 36-page "manual" on cleaning and finishing aluminum, we didn't expect orders for over 10,000 reprints of same. We've ordered 15,000 of them, and they'll be off the press before December 1st. So if you can use a dozen or so, just send money. (They're 50c apiece, and, while we don't make any money at it, we can be impressed by volume orders.)

Write to Associate Vice President in Charge of Reprints on Finishes for Aluminum. If you can pass the test, the reprints will be dispatched by the fastest means known to man.

Thinwall Aluminum Conduit Has Underwriters Approval

Sirs:

The purpose of this letter is to convey our thinking to you. . . . The matter in question pertains to statements printed in your October, 1959 issue on page 82, paragraph 3 of the article entitled, "Primary Producers Put Pressure Behind Aluminum Conduit Sales." The statement reads as follows:

"Thinwall aluminum conduit is made in four sizes by drawing from heavier extruded stock, but it can't qualify for Underwriters Laboratories' approval and rarely, if ever, meets local code requirements."

We consider this statement not true and

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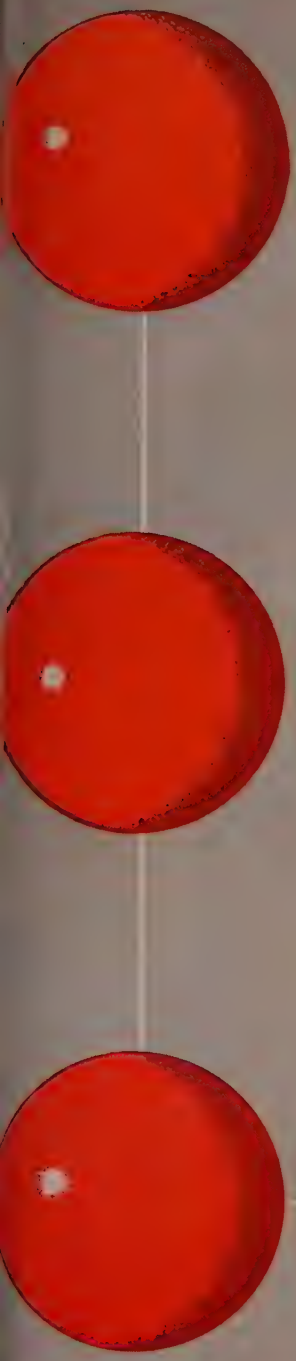

High Purity Calcium has opened new methods of production in many branches of the chemical and metallurgical industries. Calcium has reduced costs, improved quality and created new products. Application advice is a part of our technical service and Dominion Magnesium experts offer their assistance in applying calcium to your needs.

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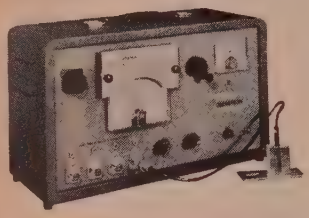

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BOX 1111

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Chicago 11, Ill.

damaging, and certainly it is misinformation of the first order.

Be advised that Thinwall Aluminum Tube is called Electrical Metallic Tubing by the Underwriters Laboratories, who have published standards for such products in steel and nonferrous metals for some years now, and have approved such products as far back as April 1942.

Channel Master Corporation has had the Underwriters Laboratories' approval on Aluminum Electrical Metallic Tubing since February 19, 1959 and has affixed, to every length of tube, the Underwriters Laboratories' label. We are enclosing a copy of the original approval to Channel Master Corp. as proof of this fact.

We have been marketing this product now for six months, and at present some of our mill capacity has been turned over to the product. Again, bear in mind every ten-foot length of this material bears the Underwriters Laboratories' label of approval.

Now, for local code requirements. Based on the above fact, somebody is consuming this product, and it is meeting some local code requirements.

Be advised that the National Electrical Code issue 1959, and prior issues, published by the National Fire Protection Association, lists the use and code on Electrical Metallic Tubing, and, in all but a few confined job areas, the applications are very much the same as rigid Metal Conduit in the six sizes that this product is made. Just as in Rigid Metal Conduit, local code conditions may exist as well with Electrical Metallic Tubing, but all concerned parties work with the National Fire Protection Association and with the local inspectors.

Your article, and particularly the references we have stated, creates a damaging and confusing effect on the electrical trade, and, as a result, will hinder acceptance.

We have been promoting, doing educational work, selling and advertising this product in "Electrical Wholesaling" and "Electrical Construction and Maintenance" magazines, and we enclose copies of these advertisements.

We regret that this unfortunate incident has occurred, but sincerely trust that you will do the proper thing and correct this matter.

"M"—New York

MM—We goofed!

We simply got the wrong information, and while we know that thinwall conduit is made, our impression had been that it found use only in rare instances. Since Modern Metals' readers aren't electrical contractors nor the ultimate user, our error isn't about to put the sting of death on Thinwall Conduit.

We have checked with Underwriters Laboratories, who stated that Channel Master conduit complies in every respect.

Our apologies to Channel Master Corp. of Ellenville, N. Y. We hope the company sells ten billion feet of their "EMT" Thinwall Aluminum Conduit.

Conduit for Everyone

Sirs:

If our "slip-stick" is still functioning, and fairly accurate, your October article on aluminum conduit tells us that the price is very low. Like under 30c a pound, for example.

How in the world can the aluminum producers think that when the steel fellows get around to looking for new (or lost) business, they won't cut them off at the knees, or above? I happen to work for one of them, and . . .

"M"—Pennsylvania

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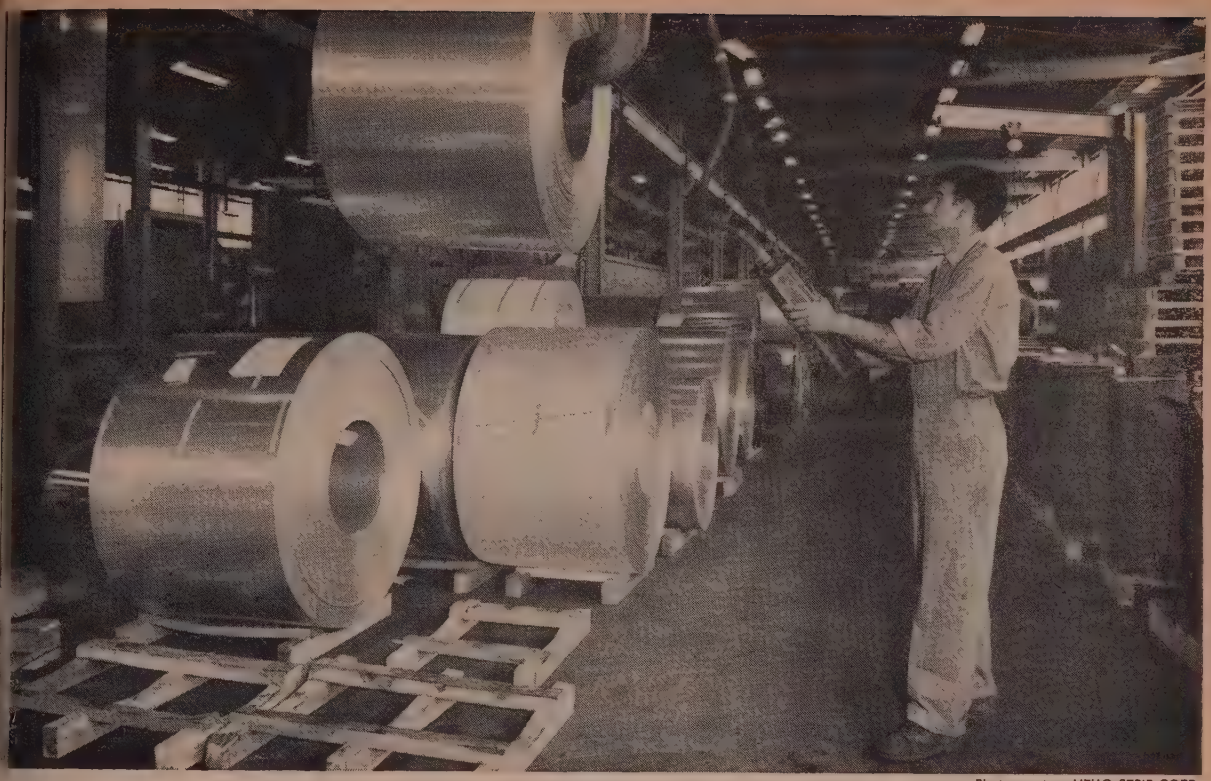

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NOW-Your Product, too, can have the extra values of BONDERITE for Aluminum!

SPECIFY BONDERIZED AND PAINTED ALUMINUM STRIP

Get the jump on your competitors by offering the well-known extra values of Bonderite for aluminum on your products.

If your production justifies it, install a Bonderite line; if you don't want to make the investment right now, specify BONDERIZED and painted stock from your supplier.

Bonderite on aluminum adds tremendously to the appearance and performance life of the paint finish. Paint is anchored so securely that stamped and roll formed products may be fabricated without chipping or peeling of the paint film or any loss of adhesion, even after most severe deformation.

To meet and beat competition, equip your products with recognized Bonderite sales appeals:

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2. Positive corrosion control.
3. Increased paint durability.

More than 200 plants, of all sizes, are using Bonderite for aluminum today. Investigate for *your* plant now!

Bonderite for aluminum meets and exceeds the requirements of Government Specification MIL-C-5541.

Since 1914— leader in the field

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BONDERITE corrosion resistant paint base

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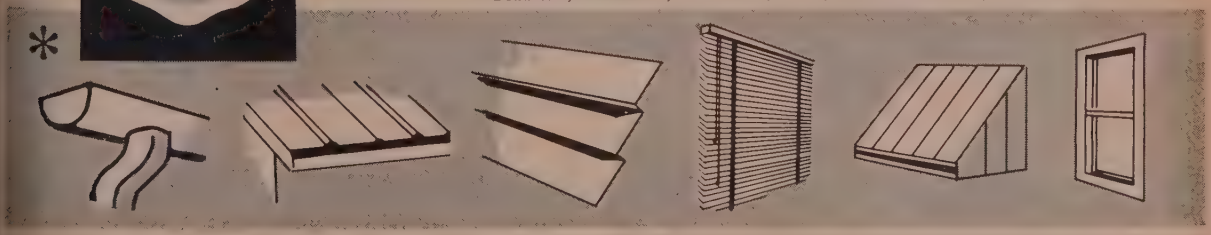


KAISER ALUMINUM

ALUMINEWS

NEW PRODUCTS...NEW MARKETS...WITH KAISER ALUMINUM!

New Colorweve Beautifies Chain Link Fence

New Colorweve aluminum coil strips convert ordinary chain link fencing into a colorful, windproof fence that provides complete privacy.

Specially tempered aluminum strip stock is covered with a baked-on vinyl finish for colorful beauty. The strips are woven through the chain link fencing to provide a solid fence that won't rot, never needs painting, requires no maintenance.

Colorweve is manufactured in 2,500 foot coils wound on a 5-inch diameter core pierced with a 1¼" hole. It is produced in six colors. Distributed by Plastic Lume, Inc., Sausalito, California.

For complete information, send in the coupon below.

Aluminum Drawers for Quality Cabinets

Kitchen Maid, of Andrews, Indiana, one of the leading makers of quality kitchen cabinets, now offers strong, lightweight aluminum drawers as a unique feature in their cabinets.

The drawers, made from Kaiser Aluminum sheet, are easy to clean and quiet in operation. They slide smoothly even when filled. And, because they're aluminum, these drawers will never rust or chip, never need refinishing.

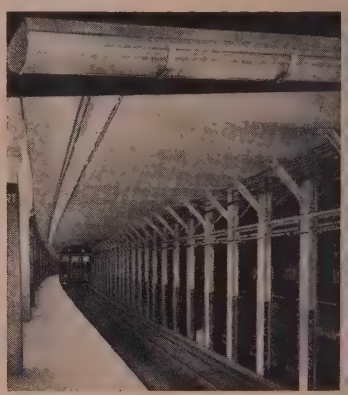
Aluminum drawers are one of many quality features of Kitchen Maid cabinets, including Loksafe adjustable shelves, sliding glass doors, and rotating shelves in corner wall cabinets.

For complete information, send in the coupon below.

Aluminum for Weathertight Fluorescent Luminaires

McPhilben Lighting, Inc., of Brooklyn, N. Y., now offers their 98 Line Vaportight Fluorescent fixture made with non-corrosive extruded aluminum—ideal for wet locations requiring high intensity lighting.

The fixture features an extruded aluminum housing for high corro-



sion resistance and high strength. It's finished with baked satin aluminum enamel over a prime coat of zinc chromate for enduring protection. End caps, coupling brackets and glass supporting mullions are solid die-cast aluminum made to withstand shock, strain and corrosion.

For complete information, send in the coupon below.

Please send me full information on the products checked below:

- ☐ Colorweve
- ☐ Kitchen Maid Cabinets
- ☐ 98 Line Fluorescent Luminaires

Kaiser Aluminum & Chemical Sales, Inc.
Dept. P-49, 1924 Broadway
Oakland 12, California

Name_____

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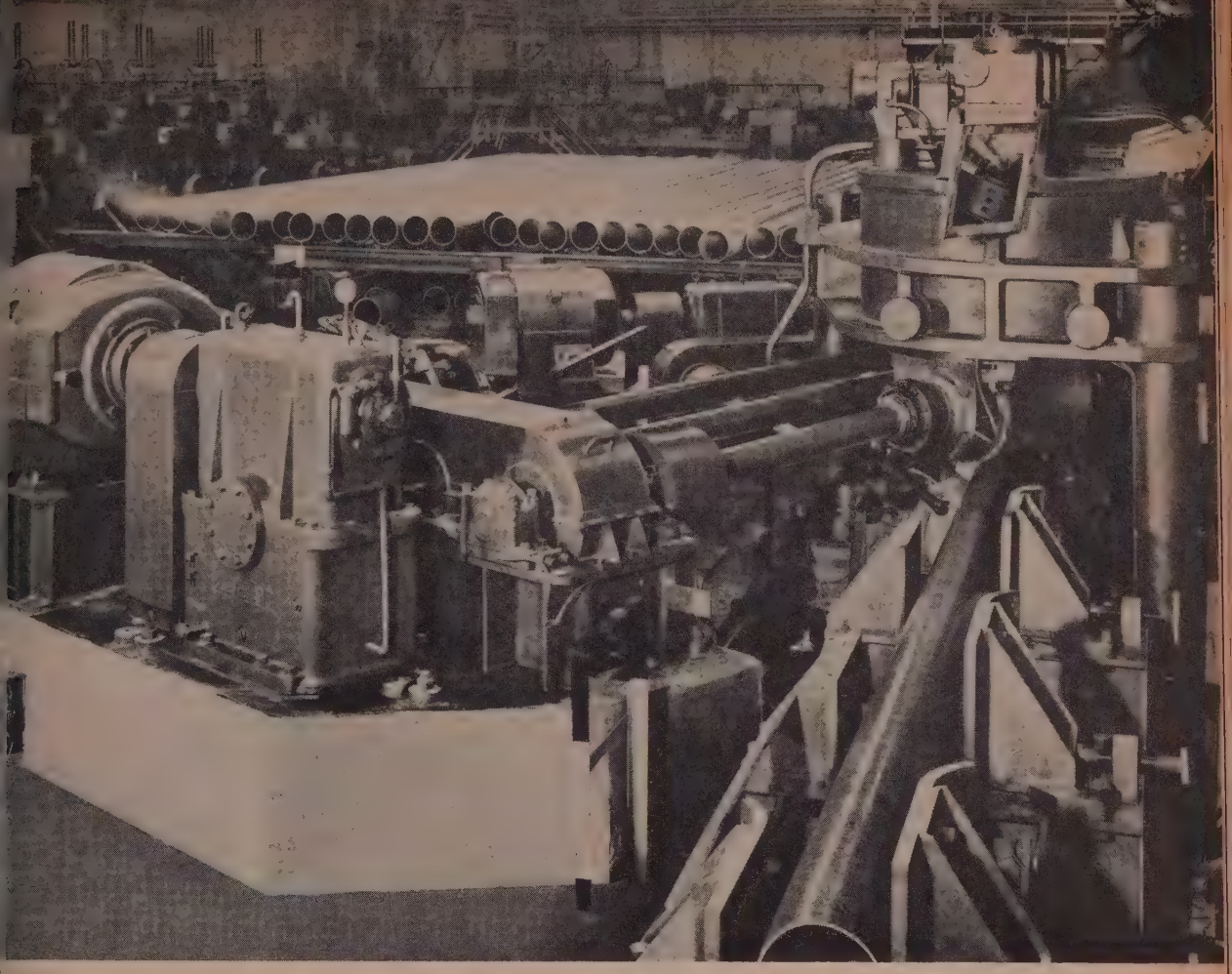


How to straighten the really big pipe!

One major Eastern steel producer has found the answer – the big Mack-Hemp Model A-5 Straightener shown above—the largest of its type in the world!

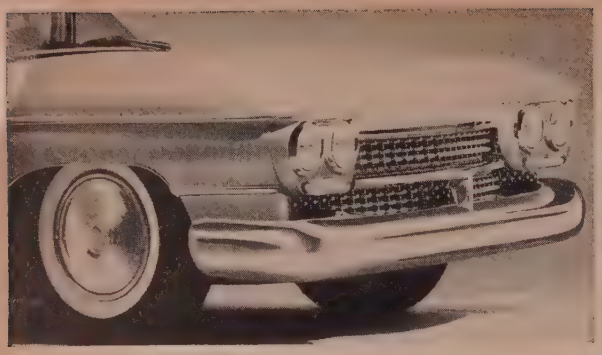
This A-5 takes really big bowed pipe from the sizing mill, pulls it in through three pairs of opposed cross rolls and then spins it out straight and round to high tolerances in only a single pass.

This despite the fact that the steel pipe being straightened is 16-inch in diameter, fifty feet in length!

To do a job like this, of course, the massive 85-ton roll frame is a must, as are the heavy duty rolls, and the combined 200 HP motors used to drive all six of them. In its first year, this Mack-Hemp A-5 straightener has handled more than 200,000 tons of pipe.

If straightening pipe or tubing is your problem – any size, any alloy – consider doing it yourself. The men from Mack-Hemp will be glad to give you all the facts you'll want to know.

MACKINTOSH-HEMPHILL
Division of E. W. BLISS Company
Pittsburgh and Midland, Pa.



Chemical polishing cuts finishing costs

Alchemize is the preferred way to finish aluminum with any polish from satin to mirror. It is fast, costs little, needs no electricity—ideal for intricate shapes. See for yourself—we'll process your samples without charge.

Write for complete data.

Alchemize — CHEMICAL POLISH FOR ALUMINUM

Alchemize Corporation, 625 S. Kolmar at Congress Expressway, Chicago 24, Ill.

Colloidal Graphite dispersions

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Exotic Metals
Super Metals

GRAPHITE PRODUCTS CORPORATION manufactures metal working dispersions for the newer metals and alloys. Each formulation has been developed for a specific application. Factory testing has shown that some of our compounds can be used successfully in many different operations. Bulletin 581 briefly describes some of these products and their uses.

GRAPHITE PRODUCTS CORPORATION welcomes the opportunity to develop formulations to meet your particular needs. A qualified staff consisting of application engineers as well as research specialists is as near as your telephone. For immediate service telephone TUxedo 9-4221 (Warren, Ohio).

JUST A FEW APPLICATIONS:

Extruding

High Temperature Lubrication

Parting

Die Lubrication

Drawing

Descriptive literature and working samples on request.

GRAPHITE PRODUCTS CORPORATION
BROOKFIELD, OHIO

Here and There

Dig That Mileage » » The word is that Stinson Aircraft Tool & Engineering Co., San Diego, Calif., is producing an electric powered auto. The four-passenger, two-door job is powered by two rear-mounted 2½ hp motors running on current supplied by 24 2-volt batteries. The car has a 300-pound body on a welded aluminum frame. Top speed is 58 mph, and the batteries have to be re-charged every 80 miles. Re-charging cost is a theoretical 18 cents — a fuel cost of less than ¼-cent per mile. Called the Charles Town-About, its name indicates the limit of its utility.

Answer To Higher Costs? » » Transportation costs account for 5 to 20% of the final selling price of many goods now on the market, according to L. E. Galaspie, president of the Associated Traffic Clubs of America and director of traffic for Reynolds Metals Co. Handling in the factory and along the shipping route further pyramids handling costs. "These costs could be sizably trimmed in most cases through use of shipping containers which reduce the number of units handled," Galaspie said. Besides saving time and labor, containerization reduces pilferage, damage to products, and packaging and crating charges. Paperwork also is simplified. Of course aluminum is making steady gains in containerization for the obvious reasons: Its light weight minimizes tare costs; its physical properties permit construction of containers strong enough for just about any job; its corrosion resistance rules out expensive maintenance. As usual, standardization of containers is being considered long after some leading users have invested in containers which meet their limited requirements. Even so, the technique has rapidly growing acceptance and will be featured in an early issue of Modern Metals.

The All-Year Pool » » After the swimming pool — what? Why, the pool enclosure, of course. The thousands of backyard pools now in use throughout the U.S. (52,000 built in 1959 alone), to say nothing of the pools yet to be built, represent a tidy little market for the enterprising builders. Already, promotional agencies are drawing a bead on swimming pool owners, pointing out that swimming enjoyment need not be a seasonal affair and that an enclosure and its optional heating equipment heighten the desirability and the worth of the pool by extending its service through 12 months of the year. This is a sensible development, and one that will create a new market for aluminum siding, structurals and screening.

Needn't Be a "Football" » » This past summer we thought we had made quite a buy in tubular aluminum porch furniture which we purchased from one of the big mail order houses. We were impressed by the quality of construction and water-resistant fabric covering. But a few days later we saw identical pieces in a chain drug store, priced a couple of dollars less than we had paid. It points up a statement made by

From manufacture to production line consumption, *speed* is the key word at Southern Screw. Large and small volume users of screws know they can rely on Southern Screws to do any fastening job fast, because Southern Screws are built for *speed*, with *speed*, and by specialists who know what *speed* means in the profit-and-loss columns.

If time-and-money-saving *speed* is the key word in your operation, be sure your next order goes to Southern Screw Company, Box 1360, Statesville, North Carolina. Write today for current Stock List.

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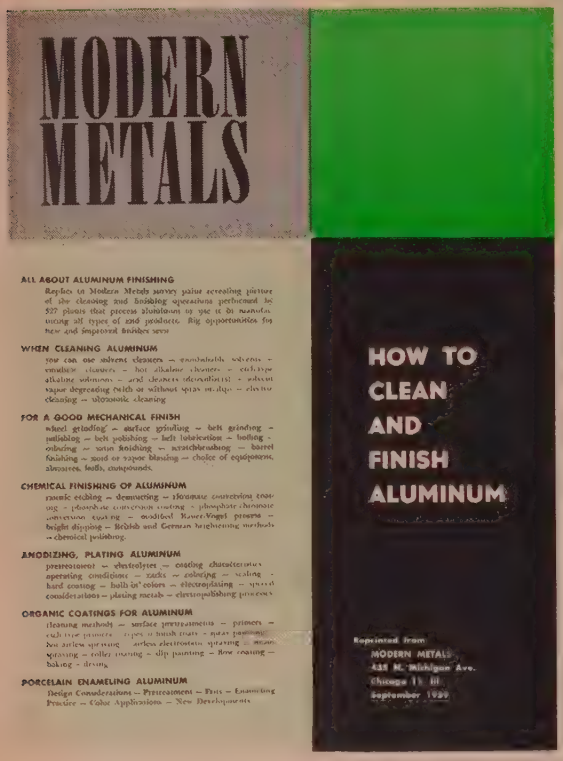

Copies of this valuable reprint are now available at 50c each. To order, simply fill in the order form below and mail it, with payment, to . . .

MODERN METALS

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Send me_____copies of the reprint, "How to Clean and Finish Aluminum" at 50c each. Payment is enclosed.

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a merchandising writer for one of the Chicago newspapers: "Aluminum summer furniture has definitely become a football," he said. "Competition from supermarkets and discount houses has cut average markup so low that it is hardly worth handling. Original markup on aluminum furniture of 35 to 39% would be sufficient if it weren't for cut-throat competition." Earlier in his article, the writer called attention to summer furniture merchandisers' search for originality in design. Rattan and wrought iron furniture, he quoted buyers as saying, are the classifications where money can still be made. What he was saying, in effect, is that aluminum furniture manufacturing is just a little too easy to get into, and so the field is populated with a lot of callous copycats who can do without originality. This is true to a great extent. But more than one summer furniture outfit has shown what can be achieved in aluminum furniture design when one dares to depart from conventional aluminum forms. We never could figure out why these companies seem to have a lucrative field so much to themselves.

When It Rains » » Before long, lucky homeowners will be replacing those rusted-out galvanized steel rain gutters and downspouts with neat, ever-lasting, trouble-free rain-carrying goods made of precoated aluminum. The new line of rain-carrying goods, fabricated by Alcoa and sold through the company's distribution channels, was introduced earlier this month at the National Retail Lumber Dealer's Association Convention in Cleveland. The product was first used on the National Homes' Viking line of aluminum clad homes (see page 32), and Alcoa reports that consumer acceptance and builder interest prompted the company to make the stuff generally available to the building industry. "Alcoa now is offering rain-carrying equipment incorporating design and finishing features unavailable in any other line," boasted E. C. Hammond, Alcoa's manager of rain-carrying equipment sales. "We think it'll revolutionize the rain-carrying equipment industry." Both Alcoa's 5-inch OG, or K type and 4-inch box gutter are available with white enamel coating for just a few cents per lineal foot above the price of unfinished equipment. Alcoa engineers say the added cost is far below that normally incurred when painting a newly installed gutter and downspout system. Adaptable for both original and replacement jobs, the equipment is formed from Alclad sheet.

That Stuff Scores Again » » Aluminum never stood a ghost of a chance as a packaging material for detergents; now it looks as though tin-plate has lost out to plastic. Such detergent manufacturers as Lever Bros., Proctor & Gamble, Armour & Co., and many concerns of lesser importance are in a neck-and-neck race to get national coverage with their laundry and dishwashing compounds packaged in non-metallic containers. The detergent manufacturers finally adopted plastic because the can makers needed an entire year to make certain that a lacquer would hold a new detergent. The plastic containers are more expensive than tin-plate, but they're expected to be more economical later. Armour has already started selling Liquid Chiffon in plastic; reports that a case of detergent weighs two pounds less in plastic than in steel.

RE YOU ON THIS MAP?

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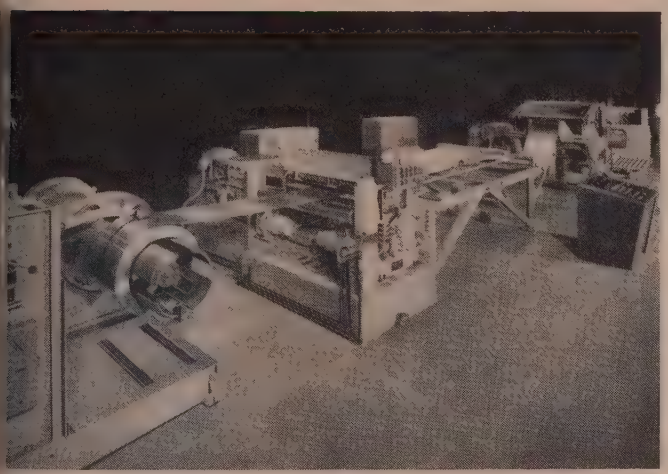

roll view of new Voss "coil leveling line" for production of siding quality aluminum o 48" wide. Modern equipment such as this means better quality aluminum from et Aluminum Corporation.

It's hard to beat the combination of personalized attention from a small, experienced company that possesses some of the biggest and best equipment in the industry. You get top quality aluminum and you'll always be certain that your specifications will be met.

Sheet Aluminum Corporation operates a modern 4-Hi rolling mill . . . a new 48" Voss Leveler and matching units to custom roll aluminum to any thickness from .006" to .102" in coil or sheet . . . widths from 3/8" to 48". A wide range of alloys include 1100, 3003, 5005, 5050, 5052, 5357 and 5457.

On your next order for coil or strip aluminum, get personalized service . . . faster service . . . better service . . . from one of America's most experienced and best equipped custom rollers . . . SHEET ALUMINUM CORPORATION.

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Useful Data

Ultrasonic cleaning, and how to use it to its best advantage, is subject of Bulletin 16A, prepared by Oakite Products Inc. Cleaning solutions for the ultrasonic process are discussed and include a mixture specially suited for aluminum. Also described is the principle of process which employs high frequency sound waves to produce an intense scrubbing action. Send inquiries to Edward Carlson, Oakite Products Inc., 45B Rector St., New York 6, N. Y.

Steels for extrusion tools is the subject of a detailed manual prepared by the Ajax Steel and Forge Co. Book is divided into 11 sections, each devoted to a tooling steel. Topics covered include analysis, heat treatment, hardness value charts at elevated temperatures and after tempering, impact resistance chart at elevated temperatures and Brinell hardness charts of tested specimens. Alloying elements and application comparisons are discussed along with precautions, such as when flame-cutting or welding. Requests should be sent to J. W. Findlater, Ajax Steel and Forge Co., 205 Adair St., Detroit 7, Mich.

Heliarc welding of aluminum, magnesium and titanium can be accomplished with manual equipment described in a recent Linde Co. publication. Included are details of six torches ranging from 110 amp to 500 amp capacity, tungsten electrodes, argon gas and regulating equipment, and other welding accessories. Write to J. N. McCracken, Linde Co., 30 E. 42nd St., New York 17, N. Y.

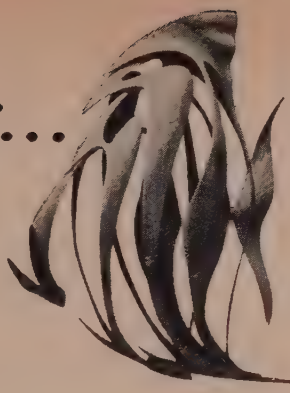
Complete metal working services offered by the Carey-McFall Co. are illustrated and described in a new 4-page brochure. The firm's facilities include cold reversing mill for aluminum or steel, continuous roller-coating painting equipment for aluminum or steel, and large stocks of aluminum and steel in various gauges and widths. Pictures show plant operations. Contact W. Reukauf, Carey-McFall Co., 2156 E. Dauphin St., Philadelphia 25, Pa.

Bulk users of screws will be able to use a new chart providing information on Southern Screw Co.'s packing and palletization system. Chart gives length, diameter and head description of screws and tells what type packages they come in. Number of pieces is also included. For copies write Thomas B. Andrews, Southern Screw Co., P. O. Box 1360, Statesville, N. C.

"Forging — Product Information," is a 336-page book on aluminum forging and forged aluminum products published by Kaiser Aluminum. The advantages and characteristics of forgings are covered in special sections. Other parts are devoted to applications, selecting alloys, types of forgings, equipment, engineering, heat treatment, and quality control. Die sinking, forging other light metals, and forging techniques of the future are also covered. An index and glossary of

HERE ARE

shapes...



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Show us the shape. Simple, complex, *or impossible*—we'll design and build the die to do the job! Building out-of-the-ordinary dies is a regular assignment at PMD. As one of America's largest independent producers of tooling for light alloy fabrication, PMD has the *men* . . . the *machines* . . . the *know-how* to handle the toughest jobs.

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25,000 firms — fabricators, foundries, die casters, product manufacturers — make up the Light Metals Industry. Our new state-by-state survey shows where these firms are and what they make. A free copy is yours for the asking.

MODERN METALS

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terms common to aluminum forging closes the book. Free copies can be obtained by writing on a company letterhead to Kaiser Aluminum and Chemical Sales Co., Inc., 1924 Broadway, Oakland 12, Calif.

Insulating building panels, consisting of expanded plastic sandwiched between sheets of aluminum, can be put to many construction uses as shown in Alcoa bulletin on Alply. Charts, diagrams and photographs point up many applications of panels. Technical data cover the material's thermal, acoustical, corrosion-resistant and strength characteristics. Joining and manufacturing standards are covered. Write John M. Mutz, Aluminum Co. of America, 877 Alcoa Building, Pittsburgh 19, Pa.

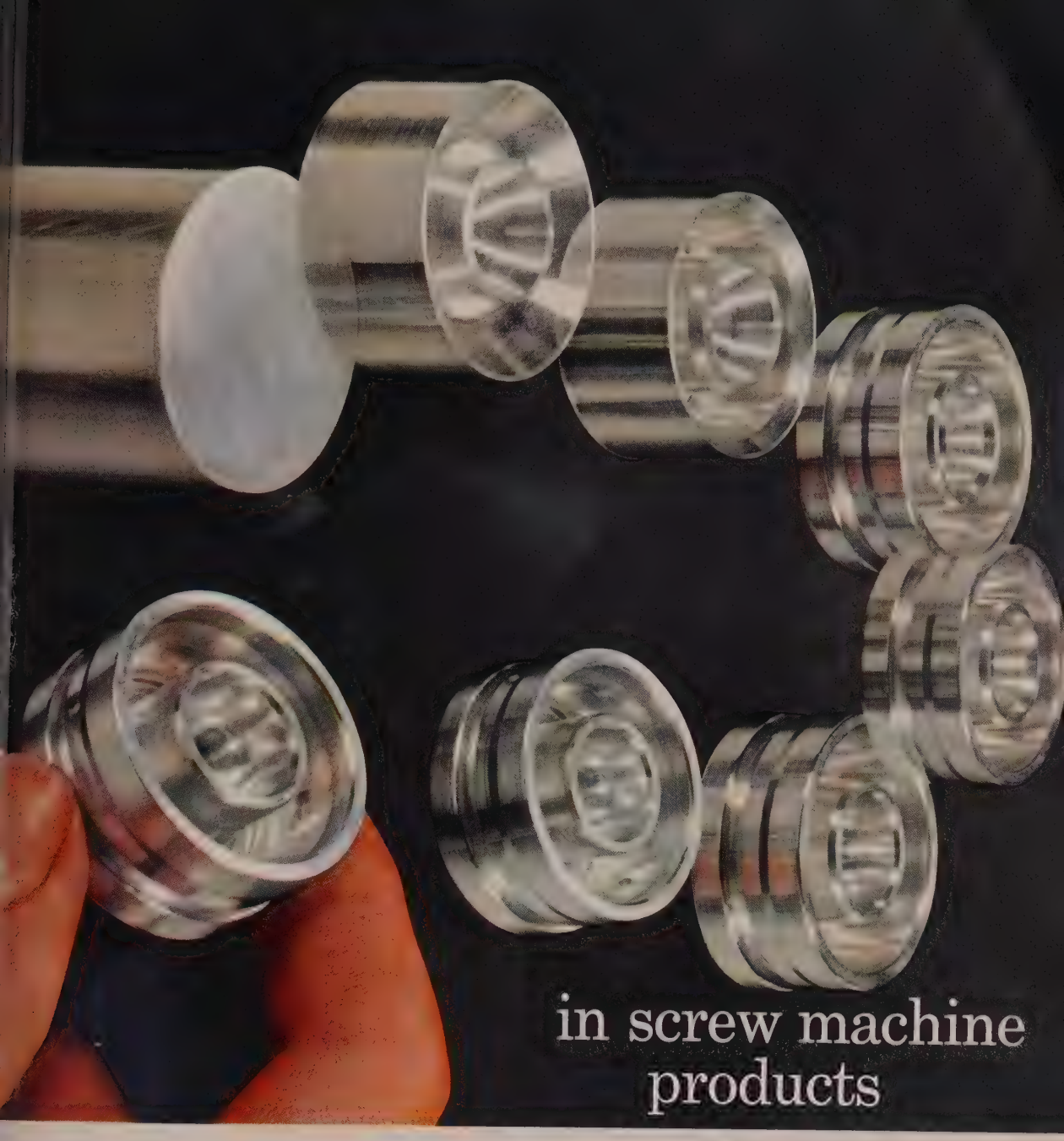
Engineering and maintenance applications of Vis count 44, a pre-hardened, machinable high-strength steel, is presented in a brochure by Latrobe Steel Co. Included are Rockwell C hardness range, physical and mechanical properties, welding procedures and a stock list. Material can be used for extrusion dies, die casting dies, shafts, axles and other machine parts. Write to Robert Ferguson, Latrobe Steel Co., Latrobe, Pa.

Thermosetting acrylic resins which can be used to finish aluminum blinds, siding, etc., are the subject of a new booklet offered by Pittsburgh Plate Glass Co. These acrylics become extremely hard, insoluble and infusible after baking, but still resist impact, chemicals, detergents, salt spray, humidity, etc. Copy of booklet can be obtained from Tom Riley, Pittsburgh Plate Glass Co., 1 Gateway Center, Pittsburgh 22, Pa.

Processing ovens for aluminum solution treating, aging, homogenizing and other industrial processes are illustrated in bulletin from Hevi-Duty Electric Co. Advantages and special uses for various ovens in line are presented. Oven types include tower, rotating tray, multiple-level belt dryers, floor rack conveyor and ceiling mounted monorail conveyor ovens. Send inquiries to Robert A. Cook, Hevi-Duty Electric Co., Milwaukee 1, Wis.

Spray lubrication of aluminum extrusion dies is a special case history prepared by The DeVilbiss Co. Pictures show how the process works and diagrams are used to further explain it. Spray lubricating equipment is also shown. Materials used and all equipment are described in detail. Write to Homer A. Lange, The DeVilbiss Co., 300 Philips, Toledo 1, Ohio.

Abrasive wheel recommendations for grinding everything from agate to zirconium are tabulated alphabetically in a new 57-page Specifications Catalog published by the Carborundum Co. Material, work, operation with their respective recommendations on abrasive, grit, grade and bond are listed for quick reference. This comprehensive catalog, with over 1600 experience-tested grinding recommendations, is being distributed at no charge on a "first come, first served" basis because of the limited number printed. Write to the Advertising Branch, Carborundum Co., Niagara Falls, N. Y. for your copy.



Alcoa puts the metal where you want it

This aluminum piston for an automotive air-conditioning compressor shows how far Alcoa goes to put the metal where you want it. Not just in primary screw machine operations, complex and demanding as they were, but on through a series of exacting secondary operations that enabled us to deliver a completely finished part.

Using 1 1/16-in. diameter 2014-T4 cold finished bar on a six-spindle automatic, we handled the forming, trepanning, drilling, facing and counterboring. Then we tackled the rest of the job—drilling and deburring two 1/16-in. cross holes. This was followed by coining the ball seat at a specified tonnage in order to insure proper assembly without distortion. Centerless grinding was then performed to a total tolerance of half a thousandth of an inch (plus or minus 0.00025 in.). All finished? Not by our standards. After final inspection, we cleaned every piece and packed it with meticulous care to prevent damage in transit, insuring safe and sound arrival.

Whether it's screw machine parts, forgings, castings, extrusions or impacts, Alcoa can put the metal where you want it—precisely and economically. The payoff may be fewer rejects, new flexibility in design, less waste in production, a best-selling product—or all four. To draw on Alcoa's file of ideas and Alcoa facilities, write today: Aluminum Company of America, 920-K Alcoa Building, Pittsburgh 19, Pa.

Alcoa puts the metal where you want it—in castings, forgings, impacts, extrusions and screw machine parts.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

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New Enterprise

age Associates, 14 Bridge St., Cranston, R.I., is ducing a new automatic **weatherstrip for double** rs. Called Doubl-Chek, the anodized extruded alu- num weatherstrip is made in natural aluminum, nze and other colors. It is said to provide a positive l while permitting easy opening and closing; pre- its cool air leakage when air conditioning is in ; and is an efficient insect barrier.

Turret type **electrical outlets** for laboratory, office plant are cast in aluminum by Simes Co., 114 15th e., College Point 56, N. Y. Bases for both models 4¾ inches diameter for mounting on floors, lab nches, desks, etc., attached by threads in the base ¾ or ½-inch conduit or fastened with screws. The ret is supplied with or without 3-wire grounding plex receptacles, 15A, 125V, on one or both faces. tead of receptacles, standard switches can also be unted in the box and switch plates used for its face.

You can build your own **electrical panel cabinets** ng standard stock parts made by Aircraft Arma- nts, Inc., Cockeysville, Md. The aluminum cabinets ve built-in cooling ducts and protected harness ys, and are adaptable to RETMA and Western ctric panels. They offer a choice of plain top or s with installation gussets or channels. Side com- nents are available with ventilation louvers. Several s offer a wide choice of load capacities. The cabinets nply with Mil-T-17113.

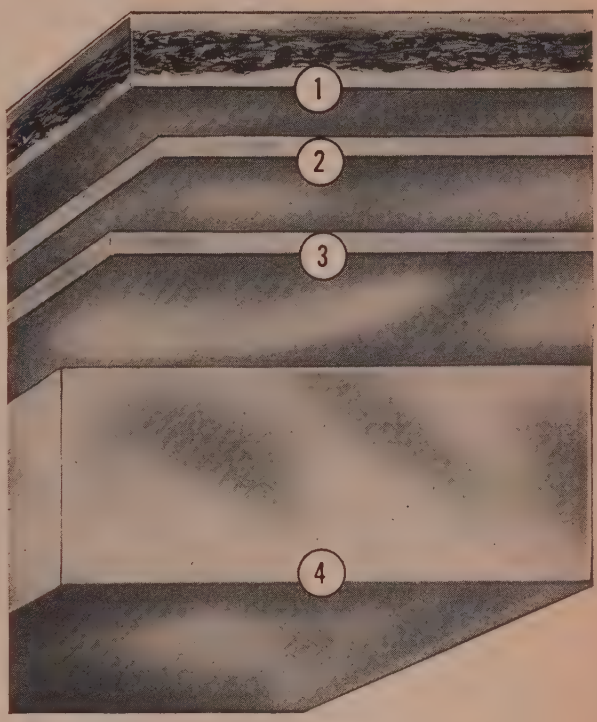
Titus Mfg. Corp., P. O. Box 591, Waterloo, Iowa, is by with its new line of extruded aluminum **air fusing grilles** which are made in over 30 louver and er 24 border designs. The line includes grilles, regis- s, linear diffusers, outside air louvers, penthouses, d exterior intake and exhaust units for all types of mmercial and industrial heating and cooling ap- cations. Units are made in a variety of finishes d colors.

American Art Metals Co., 433 Highland Ave. N.E., lanta, Ga., calls its new **curtain-wall system** the HV imline. It combines aluminum extrusions with yed-in vinyl glazing strips, and is made in 12 stand- d combinations out of which a variety of patterns n be built.

Republic Powdered Metals, 4050 W. 150th St., eveland 35, is training its sights on the residential ld as a market for its asbestos fibered liquid alu- num **roof coating.** Alumanation is said to coat, caulk, terproof and rustproof roofs in one brush or spray plication; will reflect over 65% of sun's radiant at, reduce interior temperatures 12 to 18°.

Completely weatherstripped, heavy aluminum framed **tio door** is made in 6, 8, or 12-foot widths by Rugged lling Door Co., 5425 Blossom St., Houston 7, Texas. he company offers the choice of KD or fully as-

B&P PLATE and SHEET



① **BORAL PLATE** Boron-carbide suspended in aluminum and clad with pure aluminum. For shielding against neutron passage. Available in a wide range of sizes and B_4C content.

② **HK31 AND HM21 SHEET AND PLATE** Magnesium-thorium alloys for elevated temperature applications such as missiles and high-speed aircraft.

③ **AZ31 SHEET AND PLATE** The most widely used Magnesium alloy for service conditions where temperatures do not exceed 300°F.

④ **TOOLING PLATE** Combines light weight, low cost with free machining, close flatness tolerances, dimensional stability, excellent weldability, good stiffness and strength, high damping capacity and freedom from porosity.

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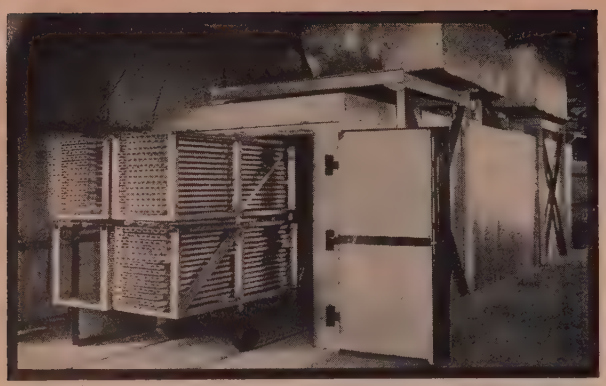

carl mayer Designs and Builds
Better ALUMINUM Extrusion
AGEING OVENS

This truck type oven is now in service at Penn Extrusion Corporation, Erie, Pa. Close temperature control is maintained through the use of two gas fired, recirculating air heating systems. Other Carl Mayer design features assure trouble-free, economical operation. Write for Bulletin HT-53.

THE **carl mayer** CORP.
20800 CENTER RIDGE ROAD, CLEVELAND 16, OHIO
OTHER PRODUCTS: Core & Mold Ovens • Rod Bakers • Paint and Ceramic Drying Ovens • Special Processing Equipment & Accessories

ALUMILITE
Sulfuric Acid Anodizing
Parts big or little, many or few

- 25 years experienced know-how can spell the difference between expensive and economical costs for you.
- Completely equipped for single job or contract work, with ample warehousing facilities, available to meet your production schedules on practically any size job.
- Send sample or drawing when requesting quotation.
- Anodizing to government specifications.
- Authorized licensee since 1932.
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CITY PLATING & POLISHING CO.
Division of CIPCO CORPORATION
22nd & Cole Sts. St. Louis 6, Mo.

sembled (glazed) shipment. The door is simply nail into place, or, for masonry construction, the fin pe off and masonry anchors snap securely into the sas

Quaker State Metals Co., Lancaster, Pa., has broug out a new perforated **aluminum soffit material** whi opens 14% of the surface for ventilation and eli inates the need for soffit louvers. The product is su able for homes, schools and industrial plants, b can also be used for room dividers, screening a other decorative applications. Whether supplied p forated or non-perforated, the material is packaged 100-foot rolls in 12, 18, 24 and 36-inch widths.

If business at Radiation, Inc., Melbourne, Fla., any yardstick, the electronics industry has a goo year ahead of it. As of mid-year, Radiation was r ported to be receiving new contracts for **electroni gear** and instruments at the rate of $325,000 a wee Radiation president H. R. Denius expects the u trend in orders to continue for the rest of the yea "The orders are highly diversified," he said, "cove ing tracking antennas, telemetering data acquisitio systems and research system studies."

Ventilator curbs made by Penn Ventilator Co., Goo man St. and Allegheny Ave., Philadelphia 40, have self-flashing feature which speeds the building jo The Sonotrol curbs can be ordered as soon as ro opening dimensions are known, delivered to the j when needed. Ventilator, damper and extruded cu are supplied together. Acoustical and thermal insu tion of the Sonotrol curbs smother appreciable p centage of fan noise.

Seeco Foundries, Box 3244, Charlotte 3, N.C., mak a line of cast aluminum **trowels and transplante** The patented tools are designed to fit the hand a have a special depression which guides the thum

Now you can get aluminum **counter moldings** th match formica, micarta, consoweld and other coun covering materials. The aluminum has a dural veneer of wear-resistant plastic permanently bond to the surface—in colors and patterns identical to th of the counter or wall. Kalwood matching moldin are made by Keller Products, Inc., 45 Union S Manchester, N. H.

Now **over-sized entrances** encountered in commerc and industrial buildings can be provided with o piece constructed aluminum frames and doors resu ing in more attractive and stronger storm protecti according to Diamond Manufacturing Corp., Mid Village, N.Y. The firm is making a one-piece dra circle door from 22 inches to 84 inches in width. T company says that this 84-inch circle will permit signers to figure on a multitude of large indust windows heretofore ignored.

Seamless aluminum tube is now being distributed Chase Brass & Copper Co.'s warehouses in Charlo St. Louis, Kansas City, Cincinnati, Denver, Milwauk and San Francisco. The tube is made from 300 aluminum alloy, is air pressure tested before pack

2243 MODERN WINDOWS BY DISCO MADE FROM WOLVERINE EXTRUDED ALUMINUM SHAPES!

Corrosion-resistant, warp-free, weight-saving . . . as modern as tomorrow . . . are the Disco reversible aluminum windows manufactured by the Decatur Iron and Steel Company, Decatur, Alabama.

Illustrated here are three buildings containing 2243 modern Disco windows. They are manufactured from 124,000 pounds of extruded aluminum shapes produced in the Decatur, Alabama plant of Wolverine Tube.

Wolverine is proud that its extruded shapes and extrusion facilities are helping Disco, and other aluminum window manufacturers, bring new styles and convenience to American homes and buildings.

Wolverine Tube's extrusion alloys are EC, 1100, 3003, 6061, 6062 and 6063. Extruded aluminum products include tubing, bar, and solid, semi-hollow and hollow shapes—all in a wide range of sizes. Wolverine also produces drawn aluminum tube.

If your company uses aluminum tube or extruded aluminum shapes why not get a Wolverine quote before placing your next order? You'll appreciate Wolverine quality and service. Write, too, for the Wolverine Aluminum Catalog.

CALUMET & HECLA, INC.
CALUMET DIVISION
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GOODMAN LUMBER DIVISION
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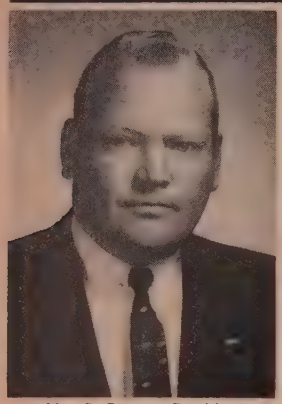
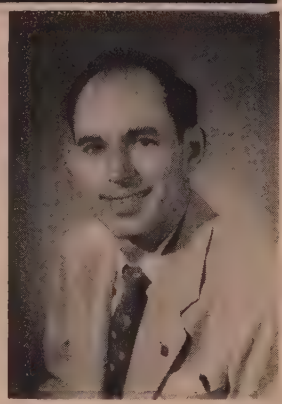
Manufacturers of Quality-Controlled Tubing and Extruded Aluminum Shapes

PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA. SALES OFFICES IN PRINCIPAL CITIES.

This is the team . . .



Alan P. Benson, President



Leon Harmon, Vice President

Peter G. Medonis, Sales Manager

. . . hitched to the most modern extrusion facilities available

Producing the quality of product and service required to give you better extrusions, better finishes for finer end-products.

Production-geared deliveries by our trucks.

7" extrusion capacity for a wider range of solid, semi-hollow and hollow extruded aluminum shapes.

We are truly designed for service.

LET US PROVE IT!

BENSON ALUMINUM CO., INC.

Connersville, Ind. **Phone: 1850**

and meets safe bursting pressure standards. It's findi a good application in plumbing, heating, applianc and the refrigeration industry. Chase is also wareho ing aluminum round rod for screw machines, as w as extrusions, in its Houston warehouse. This firm now distributing aluminum in nearly all of its wa houses.

Ten-foot diameter **aluminum ribs** weighing pounds each are being fabricated by H & B Americ Machine Co. in Indianapolis. The ribs are produc on a tape-controlled, profile milling machine made Bendix Aircraft for the Air Corps. The complete r is a critical part of the new Atlas missile, being ma by Convair Division of General Dynamics.

Volume production of aluminum fascia in standa sizes for residential housing is a new product of S mica, Inc. of St. Louis, Mo. This large manufactur of aluminum siding will also supply aluminum so for this roof overhang system. Solmica sees a treme dous potential volume in aluminum **fascia and so** because these products enable a builder to constru a maintenance-free system of eaves.

Thomas Crafts, Wilmington, Ohio, makes cast a minum **flower stands,** settees and other types of gard and patio furniture. The 33-inch-long settees wei under 30 pounds.

Gutter guards which keep leaves and small branch out of rain carrying troughs are another use of p forated aluminum. The gutter guards made by Lo hart Mfg. Corp., 6350 E. Davison Ave., Detroit have a snap-on feature and have a turned-up out edge to keep dirty water from dripping down t side of the house.

An intricate aluminum extrusion makes up the c of the Flexmore **grinding wheel,** product of Nu-Ma Grinders, Inc., 8224 Carnegie Ave., Cleveland 3. C design permits firm anchoring of rubber flexers whi support the abrasive band or sleeve. Centrifugal acti of the revolving wheel pulls the flexers outward, t producing a constant, positive grip that holds t abrasive band in place.

Power roof ventilators come big when they're ma by Ilg Electric Ventilating Co., 2828 N. Pulaski R Chicago 41. Eleven size range of ventilators inclu low aluminum housings which cover direct-c nected, patented "Q" type fan wheels and permane split capacitor single-phase motors or 3-phase mot Exhaust capacity is up to 21,100 c.f.m.

An aluminum pipe fitting made by Dresser M Division, 102 Fisher Blvd., Bradford, Pa., prod compression seals for threadless couplings, gives p deflection up to 6° for 150-pound service, absorbs i bration, expansion or contraction and other pip stresses. All that's required for installation is a wre Style 38 coupling for 2 to 6-inch O.D. pipe con of a central cylindrical ring with flared ends, t follower rings, two gaskets and a set of steel t head bolts. Conical flares receive the wedge of e gasket. Follower rings restrain outer ends of the ket. Tightening the bolts compresses the gasket

Your Key to *Sunbeam* Services . . .

. . . Your *Sunbeam* Furnace Representative

BEHIND HIM ARE A TEAM OF EXPERTS—The entire Sunbeam organization of engineers and service personnel. It's made up of:

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196 Mercer Street, Meadville, Pennsylvania

Alcoa is Telling America... Give

"STAR LIGHT, STAR BRIGHT GIFTS OF ALUMINUM!"

*Another Alcoa "Market-Maker" Promotion—December

Millions will see it . . . millions more will hear it . . . Alcoa's nationwide message to America: "Give Star Light, Star Bright Gifts of Aluminum!"

On Alcoa Theatre (NBC-TV Network, alternate Mondays, 9:30 p.m., EST) . . . two hard-hitting commercials, each going home to 25,000,000 viewers with the aluminum's-for-gifts story.

On Alcoa Presents (ABC-TV Network, every Tuesday, 10:00 p.m., EST) . . . four more giftware commercials, presented on one of the nation's most dramatic television series to a skyrocketing audience of more than 23,000,000.

On Network Radio . . . reaching an estimated 3,000,000 listeners with multiple sales messages on aluminum giftware.

*"MARKET-MAKER" symbolizes Aluminum Company of America's year-round sales-stimulating programs for manufacturers and retailers of aluminum products. Watch for other "Market-Maker" promotions of FURNITURE • HARDWARE • COOKWARE • BOATS, MOTORS AND ACCESSORIES • SPORTING GOODS • MAJOR APPLIANCES • RESIDENTIAL BUILDING PRODUCTS

Make it pay! Tie in with Alcoa's sales-making them "GIVE STAR LIGHT, STAR BRIGHT GIFTS ALUMINUM!"... feature it in your own advertisi and promotions.

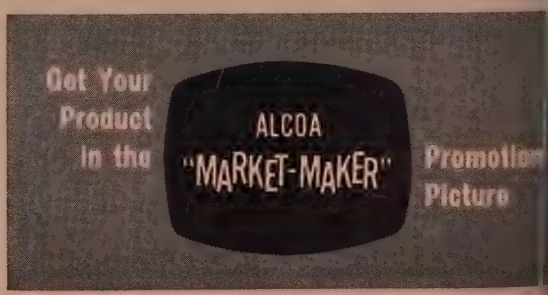
8 OUT OF 10 BUYERS KNOW THIS LABEL... IT'S THE BRAND BEHIND THE BRANDS THEY BUY

ALCOA ALUMINUM

Your Guide to the Best in Aluminum Value

Manufacturers of aluminum giftware products are invi to write us or contact the nearest Alcoa sales office details on the simple agreement that entitles them to labeling privileges.

Aluminum Company of America, 1600-L Alcoa Bldg., Pittsburgh 19



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Combination 4 High/2 High Cold Mill . . .

Does the work of two separate mills

"Duncan" and "Versenally" are the words that best describe the new combination 2 High/4 High Cold Mill designed and built by PITTSBURGH to [illegible] gauge, temper and finish for the ferrous and non-ferrous industries. As a 4 High Mill it is used for cold reducing, as a 2 High Mill it is used to acquire the desired temper and finish. Manual and automatic features are incorporated to keep roll change time to a minimum. Low initial cost and economical operation are attractive plus values.

HEAVY MACHINING FACILITIES

Our plant is equipped with a superior complement of well diversified machine tools that are available on a continuing basis for economical machining of heavy castings or the manufacture of auxiliary rolling mill equipment, such as heavy mill tables, furnace pushers, slab depilers, downcoilers, ingot buggies, slab transfers, etc.

PITTSBURGH
ENGINEERING & MACHINE DIVISION
Pittsburgh Steel Foundry Company
TEXTRON, INC.

BOX R, GLASSPORT, PENNSYLVANIA · PLANTS AT GLASSPORT & McKEESPORT PA.

CONSUMPTION OF ALUMINUM IN BUILDING

has quadrupled since 1947, but . . .

. . . it's only the beginning. Spurred by mass volume use in homes and other types of construction, aluminum's gains in the building industry in the decade of the '60s will eclipse past growth in this market. Consumption expected to hit 750,000 tons next year; 800,000 tons may go into new home construction alone by 1965.

by F. L. Church, Senior Editor

APPROXIMATELY 25% of all the aluminum consumed in the U. S. this year will go into all types of building and construction. The actual quantity will be something like 550,000 tons (see front cover), but it is necessary to delve back several years to put the picture in proper perspective.

In 1947, for example, shipments of aluminum totaled nearly 938,000 tons. Building and construction took approximately 140,000 tons, or about 15% of total shipments that year. By 1950, shipments of aluminum to all consuming industries topped 1,128,000 tons, while consumption of the metal in building and construction reached 215,000 tons, or 18% of the total.

The use of aluminum in building continued to outpace the growth of total consumption throughout the decade of the fifties. By 1955, shipments to all industries exceeded 1,800,000 tons, while use in building reached 450,000 tons, or over 21% of the total. Two years later, the building industry used over 462,000 tons of aluminum, nearly 22% of total consumption.

Tripled in Ten Years

In a ten-year period, therefore, total annual shipments of aluminum had nearly doubled, while consumption of the metal in building and construction had more than tripled.

Bringing the picture up to date, shipments of aluminum to all industries in 1959 will probably approach 2.2 million tons. Consumption of the metal by the building industry will reach a record high of 550,000 tons, or 25% of total shipments. Thus, total consumption of aluminum will have more than doubled in the past 13 years, but use of the metal in building will have nearly quadrupled in the same period.

Clearly, the building industry's acceptance of aluminum as a standard construction material has played a stellar role in the meteoric postwar growth of the aluminum industry.

Peering into the future, most signs indicate that this is only the beginning. History may well record the fact that the decade of the fifties was merely a shakedown period for aluminum in building; that the era of really mass use of aluminum in all types of construction began in 1960.

Starting next year, the aluminum industry will begin to capitalize on the enormous funds it has poured into building product research, development and promotion over the past several years. According to Modern Metals' estimates, consumption of aluminum in building should rack up a steep 36.7% rise to 750,000 tons in 1960 (see front cover).

Biggest Growth in Homes

While increased use of aluminum should be chalked up in virtually all segments of the building industry in the '60s, the most dramatic growth will most likely take place in residential construction. This vast and sprawling conglomeration of builders, contractors, prefab manufacturers, lumber yards, and building product makers has stubbornly resisted the aluminum industry's intensive promotional campaign.

Distribution difficulties plus the ultra-conservative attitude of most builders and contractors have held the national average use of aluminum per new house to 40 to 50 pounds — until this year, that is. The average for 1959 is variously estimated at from 150 to 200 pounds. This is based on new housing starts totaling 1.2 million units, thus putting the use of aluminum in new homes at from 90,000 to 120,000 tons for 1959.

David P. Reynolds, executive vice president of Reynolds Metals Co., estimates that some 15,000 homes featuring aluminum exteriors will have been built in 1959. Less than 500 such homes were built in 1958.

But Reynolds' estimate may be on the low side. Presumably it includes not only the 3000 homes that will be built this year under Reynolds' "House of Ease" program, but also the aluminum-clad Viking prefabricated homes produced by National Homes Corp. National expects to produce about 42,0 units this year, and as many as a th of them will be of aluminum.

Although the number of "units" term of space measurement used prefabricators) may be somewhat l than the actual number of houses, t difference will not be very great. T actual number of aluminum-clad hou built this year could run as high 17,000 — perhaps more like 16,000.

So successful has been the Viking th National plans to go whole-hog on a minum next year. Aluminum-sheath models will be National's standard 1960, with other materials offered alternatives.

"Let me cite a recent example of h these Vikings are going," a Natio Homes official declared recently. "W had 9-day market tests running in L fayette, Ind. and Chicago, testing t 1960 line. In Chicago, 95% of 252 sa were aluminum, and in Lafayette, 90 of the 151 sales were Vikings. As whole, in markets where our build dealers have started pushing aluminu (and this is a growing thing), Viking averaging about 75% of sales.

"We are going all-out in the pron tion of aluminum in 1960. We feel th we have the lead and we are going keep it. The boys who are waiting see how we do are going to be left far behind that they won't ever reg their competitive position."

Giant Puts on Weight

National, already a towering giant the prefabricated home field, consi dated its position last summer with acquisition of eight other prefab co panies.

Already operating plants in Lafay and New Albany, Ind., Horsehe N. Y., and Tyler, Tex., National Ho now has 13 manufacturing facili within a 200-mile radius of substanti all major markets east of the R Mountains — plus its first foothold the West Coast. The builder-dealer ganization of the consolidated compa totals approximately 1000.

.though each of the acquired com-
es will retain its identity and its
der-dealer organization, each will
have its own Viking aluminum line
omes in 1960.

)ur 1960 line, including the Cape
, Colonial, Contemporary, and our
French Regency styling, will be
oduced by a thousand or more
der-dealers on the weekend of Jan-
2-3 in the biggest promotion ever
in the housing industry," explained
es R. Price, board chairman of
ional Homes.

rice emphasized that the entire ex-
or of the Viking — walls, roof, sof-
fascia, gable ends, gutters and down-
its, shutters, windows and doors
aluminum. Every component has a
manent finish of baked-on Lucite to
tect it for years against wear and
ther.

g-Lasting Lucite

eveloped by DuPont, this Lucite
lic finish is similar to the durable
uer introduced on 1959 models by
automobile industry, but it has no
n and is available in a variety of
ng colors.

This is the greatest home paint dis-
ry in 100 years," declared Price. "It
technological advance as revolu-
ary as our introduction of the Vik-
aluminum homes a year ago, a
elopment which since has brought
w standard of housing to American
ilies."

he French Regency, National's
der" line for 1960, consists of nine
lels ranging in size from 915 to 1812
ft. The dwellings are priced from
0 to $30,000, not including land,
will use from 1500 pounds of alu-
um on the smallest Fairlane model
000 pounds on the deluxe Lorraine.
eynoting the Regency models is a
aluminum siding, designed and
ineered by Alcoa to accent each
e's French provincial styling. Ap-
d horizontally, the siding is nearly
inches wide with a strength-giving
cave contour. It will be available in
election of colors with DuPont's
ed Lucite finish.

he new siding, supplied pre-coated
usively by Alcoa, is designed to be
lied at the erection site in conven-
al manner. It is brake formed from
-inch thick sheet, common architec-
l alloy in the H14 temper. The
erial weighs 44 pounds per square
) sq. ft.) and is said to have better
t resistance than conventional alu-
um siding.

he extra wide siding is applied
h a unique interlock system, and
designed so that six panels will
cisely fill the space between the
es and floor line of all French Re-
gency models. The cornice (or header) is also brake formed from .024 sheet and finished with baked-on Lucite.

Although sheathed completely with pre-coated aluminum, the French Regency models will cost no more than conventional residences of wood, brick or stone.

Another outstanding aluminum development in National's 1960 line is the use of Lucite-coated aluminum window frames. All single-hung frames will be finished with white Lucite, the first production enameled aluminum units available to the American homeowner. The windows are produced and finished by General Bronze Corp., Garden City, N. Y.

"We've received scores of inquiries about these windows since the development was first announced just a couple of months ago," said T. C. Carter, vice president in charge of General Bronze's residential window division. "More homeowners prefer not to have the natural color of aluminum in the windows of their homes. The metallic sheen does not blend well with many period styles of architecture."

The windows are of standard single-hung design "but with absolutely water-tight, flash welded corners." Each window contains from 12 to 35 pounds of aluminum, depending upon size. Glazing is with extruded hard, white plastic bead, which eliminates puttying and makes a highly weather-tight joint.

Finishing the Windows

The finishing system at General Bronze consists of degreasing, Alodizing, coating with Lucite in a Ransburg electrostatic spray booth, and baking in a 160-foot long convection type oil-fired oven. The finishing line, "which cost General Bronze upwards of $200,000" is completely conveyorized for maximum production speed and quality control.

In addition to the wide Regency siding for National's 1960 line, Alcoa supplies vertical siding sheets, roofing sheets, extrusions for trim and thresholds, and pre-painted gutters and downspouts. "We feel that the pre-coated rain carrying equipment, like the enameled aluminum windows, will become standard in the residential building field in the next five years or so," an Alcoa spokesman said.

Several of National's 1960 models will feature Reynolds Lifetime aluminum roofing shingles (at least one model will have shingled walls as well as roof). In fact, use of these 4-way lock shingles will be so great that Reynolds has set up a shingle operation in Lafayette to service the National Homes account. Shingles are fabricated from pre-coated Colorweld coiled stock shipped in from Reynolds' McCook mill near Chicago.

Reynolds will also supply soffit and fascia fabricated from stucco embossed Colorweld stock. These items have been made standard on all National Homes, even the non-aluminum models. Ribbed or fluted sheet for exterior door skins, plus miscellaneous items such as flashing and nails, round out Reynolds' list of products for National's 1960 line.

Ribbed sheet for doors will also be supplied by Kaiser Aluminum. Other Kaiser Aluminum products specified by National include stucco embossed formed sheets for "board and batten" roofs and exterior walls, plus flashing and fascia sheet. Roofing for National's new "Rose" series of homes will be of Kaiser's diamond embossed sheet, formed in a "board and batten" design.

All in all, National Homes' use of aluminum is expected to average 3.6 million pounds a month in 1960 — a 35-fold increase over the estimated 102,000 pound-per-month average for this year. If National's expectations prove out, this one company will consume upwards of 21,500 tons of aluminum next year. This would make National the largest single user of aluminum for residential construction.

But other residential projects will also contribute substantially to the use of aluminum in this important industry. The "House of Ease" program of Reynolds Metals Co. is the most noteworthy example.

As noted earlier, approximately 3000 homes using the "House of Ease" package (20 to 33 aluminum building products) are expected to be built in 1959. With these houses averaging 2500 pounds of aluminum each, the program should account for over 3700 tons of aluminum this year.

800,000 Tons By 1965?

This project and National Homes' production are concerned with new home construction, but home improvement projects have traditionally accounted for some 87% of the aluminum going into residential applications. While this percentage is certain to decline relative to new home construction, the actual *tonnage* of aluminum used in home improvement products will probably rise.

So even if home building starts drop to the one million level predicted by most authorities, aluminum seems certain to rack up substantial gains in this industry in 1960. Looking still further ahead, Alcoa predicts that use of aluminum in homes will average 1000 pounds per house by 1965. If housing starts reach the 1.6 million figure forecast for '65 by some experts, that would mean a market for 800,000 tons of aluminum for this one segment of the building industry.

a new, improved ALODINE for aluminum

Cost Saving, Time Saving ALODINE 1200S Pre-Paint Treatment Protects Aluminum Best!

IN LESS TIME—ALODINE 1200S provides increased chemical activity for dramatic reduction in processing time . . . up to 50% in most cases! You get far faster processing than ever before, with the same high quality protection!

WITH LESS EQUIPMENT—You can install an ALODINE 1200S system quickly and conveniently, *without resorting to mechanical bath maintenance!* That means no dangerous, time consuming checking routines with the possibility of bath contamination always present!

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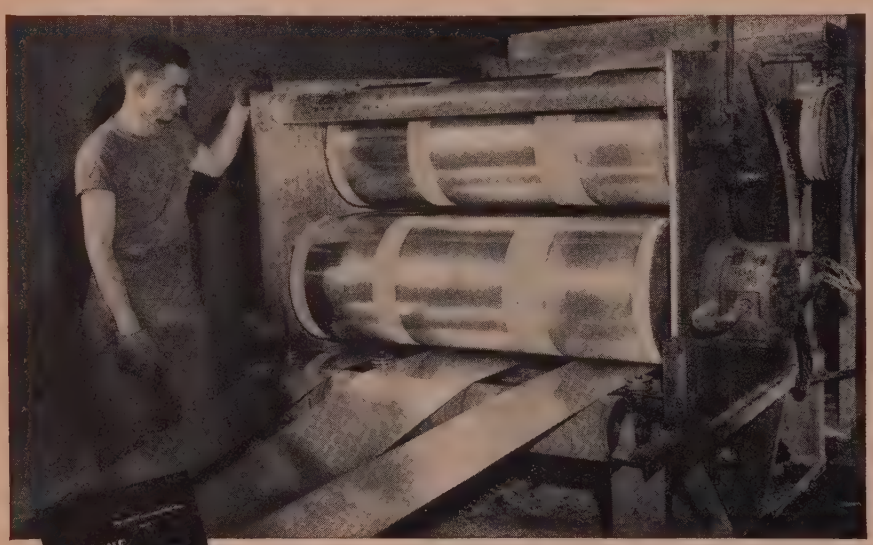
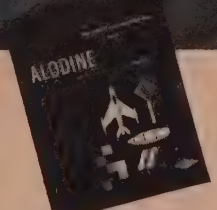


Typical ALODINE 1200S strip line installation at ALSCO, INC. Strip from aluminum coil is fed into Alodine processing baths where it is cleaned, rinsed, deoxidized, rinsed, coated with ALODINE 1200S, rinsed and given a final acidulated rinse. Strip is then rewound, roll coat painted, roller formed into final shape, backed, in- spected and packed for final shipment.



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KAWNEER GEARS UP FOR RECORD SALES IN '60

Big maker of aluminum architectural products revamps, expands production facilities; drops its aircraft parts business; gears up for record sales volume to building industry next year.

by H. K. Darby, Associate Editor

FINAL accounting procedures for 1959 could be something of an anti-climax for Kawneer Co., Niles, Mich. This leading manufacturer of aluminum doors, storefronts and curtain walls knew before the end of its third quarter that 1959 would be a record sales year with near record earnings.

In the first nine months of the year Kawneer had sales of $27,348,000, with earnings of $1,233,000. This compares with sales of $27,885,782 for *all* of 1958 during which profits totaled $979,141. However, even 1957's record sales of $33,181,491 will doubtless be surpassed when 1959's results are tallied.

"We always do 60 to 70% of our business in the last half of each year," said Lawrence J. Plym, Kawneer's president, "and we're merchandising and promoting sales in all divisions harder than ever. We are getting a larger share of our markets than we have in years past."

Kawneer is now confident that it has taken all the preparatory measures necessary for more efficient, more profitable operations in 1960. Edwin C. Witwer, secretary and treasurer, detailed the steps taken to clear the decks for a more concentrated effort in the architectural field and to tighten up Kawneer's operations generally.

Perhaps the most important move in this direction was liquidation of the Aircraft Division, a high volume low margin operation which proved to be a serious drag on profits and threatened even more dire consequences it been continued. The 100,000-squ foot modern plant built for the craft Division during the Korean is now manufacturing standard custom-made curtainwalls and wind

Kawneer also sold its Lexington, door plant and re-established manufacturing at Niles. For its Coast fabricating operations, the pany sold its original plant in Berk Calif., and moved its architect products manufacturing to ano plant in Richmond, Calif.

Thus, at the end of 1958, Kaw was operating three divisions: Arch tural Products, with two plants in and one in Richmond, Calif.; Ap ance Products, one plant in Cynthi Ky.; and Mill Products, one plan St. Charles, Ill. Kawneer Co. of Can with one plant in Toronto, is expanding operation now being sup mented by a growing overseas gr called Kawneer International which cludes manufacturing and sales ac ties in Mexico, Cuba and Australia, eventually Europe.

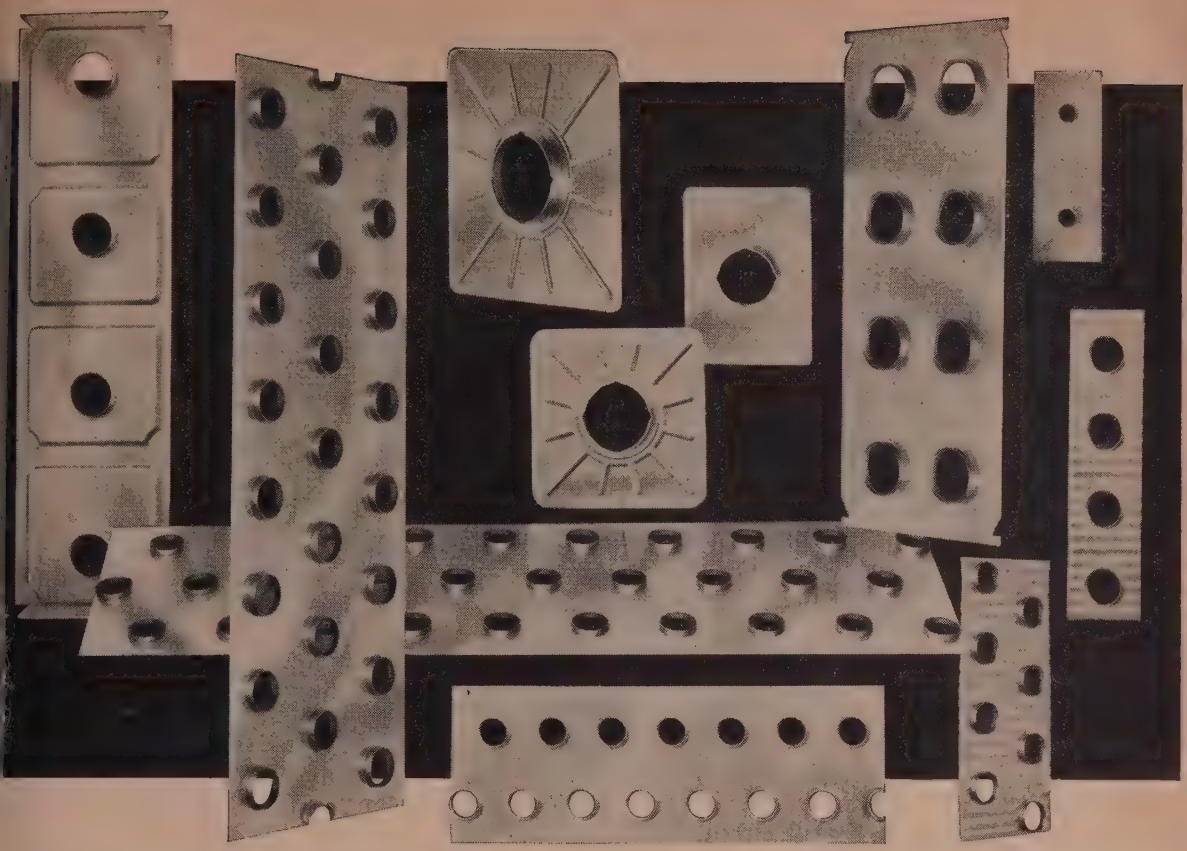
■ *Curtainwall production at Niles includes custom as well as standard designs. The broad range of materials and colors used by Kawneer in this activity assures greatest design latitude for the architect, encompassing aluminum, steel or bronze; panel facing materials, including plastic, metal, porcelain or stone; and core materials — fiberglas, or resin-impregnated honeycomb craft paper. Hardboard is used for inner facing where necessary. Curtainwall paneling is mechanically fastened or laminated, produced with or without dead air spaces. Comprehensive research by Kawneer enables architects to check performance, compatability of materials.*

Younger Plants Mean . . .

As a result of this fancy fiscal f work, Kawneer's efficient new al ment of production facilities achieved with only a $15,000 incr in the company's fixed assets. With exception of the original Niles pl the facilities are relatively new—e years old or less. Intra-company b ness is conducted more efficiently, an expansion program is underwa

In the old Niles plant, for exam aluminum anodizing capacity has b stepped up substantially. There are new tanks measuring 24 feet long feet deep, and from 36 to 42 inc wide. Work transfer is automated.

And the Mill Products Division proved so successful that Kawneer added a 1250-ton Loewy-Hydropress trusion press to the original 2250-t ner. Anodizing tanks have been stalled to implement a contract extr ing operation that accounts for roug



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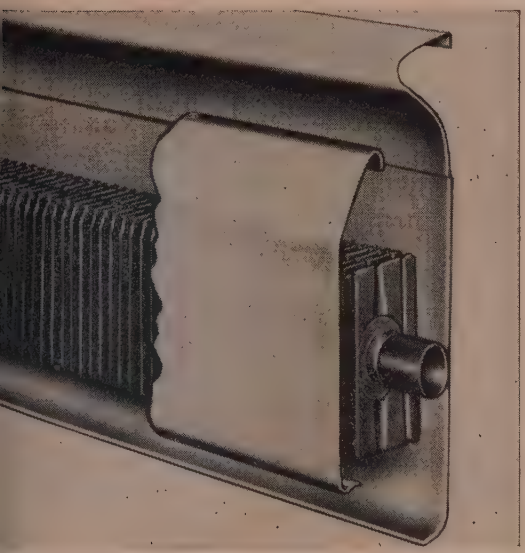

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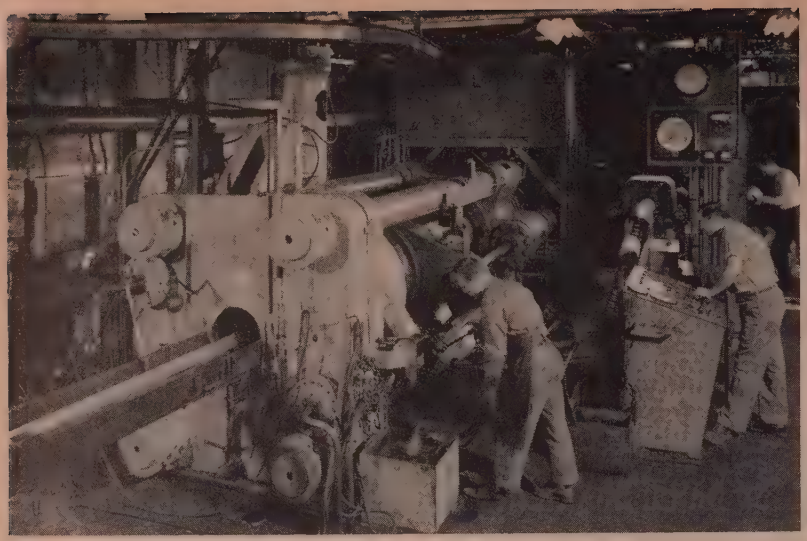


■ *Kawneer's extrusion capacity is growing. Original Architectural Products Division plant at Niles, Mich., gets by with this 1750-ton Loewy-Hydropress, but another press has been installed at St. Charles, Ill., the Mill Products Division, making two in operation there, while the Richmond, Calif. plant will have its own press soon. Man in right background is loading the Magnethermic billet heater from which billets travel down chute to press for automatic loading.*

90% of St. Charles' dollar volume.

The Division originally served only the storm window industry; it has since broadened its market and now makes extrusions for transportation equipment, appliances, computers and other products.

Mill Products, like the other two divisions, enjoys a high degree of autonomy, subject to policy guidance from Niles. Last summer it gave delivery priority to outside customers in preference to Kawneer's Architectural Division. As a result, the Niles plant bought about 1,000,000 pounds of extrusions in the open market, and the Architectural Division is no longer one of Mill Products' top 10 customers. However, Kawneer's Appliance Parts Division is in the top 10, according to S. A. Furbacher, vice president and general manager of the Mill Products Division.

The St. Charles plant casts extrusion billet not only for its own use, but also for the 1750-ton Loewy-Hydropress extrusion press at the Niles plant. This intra-company business accounts for 50 to 60% of the Division's billet casting capacity. Recently, Mill Products installed facilities for casting large rolling ingots for outside customers. This operation will start up next month.

Meanwhile, the Richmond, Calif. plant is being made more self-sufficient. Whereas Niles and St. Charles had been supplying its extrusions, the West Coast operation will be running its own Sutton press later this year and will buy billet locally. It has already been equipped with anodizing tanks.

Kawneer Co. of Canada has also expanded its facilities in Toronto.

Although Kawneer's major product lines are in the architectural field, its Appliance Parts Division in Cynthiana, Ky. enjoys continuing success. This division does punch press work, wire forming, roll forming, welding, anodizing and painting.

Making Auto Parts

At present, the Appliance Parts Division is heavily engaged in production of a wide variety of trays, shelving and trim for refrigerators. However, the Division's activities took a new direction, recently, with production of grilles for the 1960 Lincoln. [A unique method of cross-wire welding of aluminum at Cynthiana will be detailed in Modern Metals' December report on aluminum applications in the automotive industry]. Chrysler Motors is another customer of the Appliance Parts Division.

Whereas the Division had operated in two locations at Cynthiana, leased space has been given up and all operations have been brought together in one enlarged plant owned by Kawneer.

Last summer Kawneer bought Pre-Cast Industries Inc., a small concern in Kalamazoo, Mich., that makes prestressed concrete products.

"We made this move because we knew that management there was competent," Witwer said, "and because we felt that this industry has a great long-range potential. Also, we are fairly familiar with the business. They sell to architects and builders as we do."

Witwer pointed out that the protracted steel strike contributed to a substantial increase in Pre-Cast Industries' third quarter profits.

Recently, Kawneer acquired South Bend Screw Products Co. This small but efficient precision metal working firm has assumed some of the manufacturing and assembly work which Kawneer normally performed or procured outside.

"It was another step toward more complete integration," Witwer explained. "This company will produce many of the components for some of our new products."

The foregoing moves represent the major recent changes in Kawneer's physical plant which have contributed greatly to more efficient operations. While not all of them directly affected the architectural products business, that Division has produced the greatest part of the company's volume and profits. Appliance Parts is a profitable division, and Mill Products also produces a profitable return on its investment.

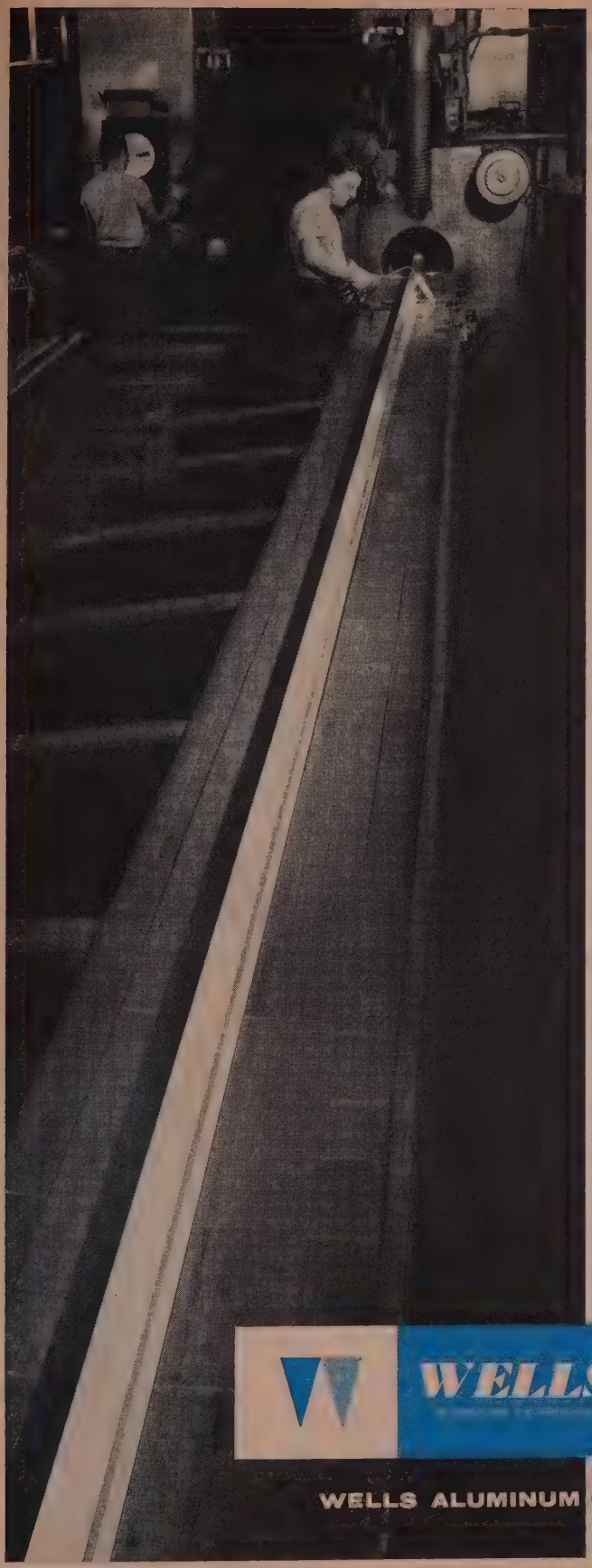
"Considering the present state of the extrusion industry, our salvation has been high efficiency coupled with a high level of activity," Furbacher said.

While the company has great things planned for 1960, the new products are closely guarded secrets.

"Unless we do this, we have little advantage over the competition which spends considerably less on product engineering and research than we do," Witwer explained.

However, 1959 has seen important new product developments at Kawneer. Among them are two new aluminum-framed, glass doors. One is an entrance equipped with an electrically operated automatic opening and closing device for single or paired doors. It is tread-

■ *Zourite is the name of Kawneer's all-purpose, lightweight aluminum facing material which is roll formed in two profiles. As these sections come off large Yoder machines, they are automatically given a mechanical finish (above), then anodized or porcelain enameled in a wide choice of colors. Zourite has been a steady seller in store and other types of business building remodeling and Kawneer's extruded shapes are used in a growing store-front market.*



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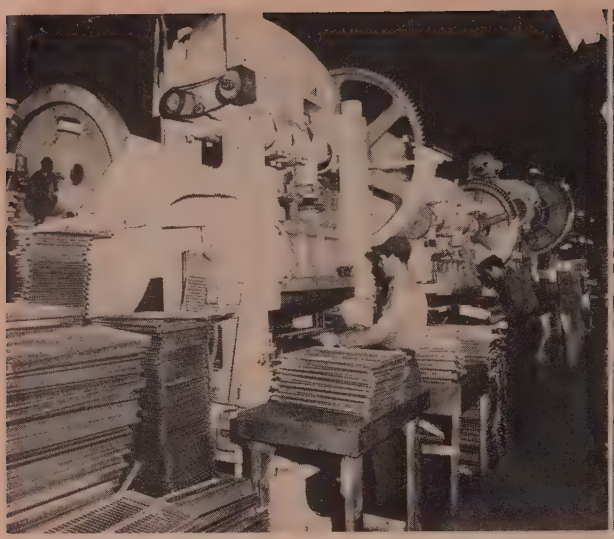
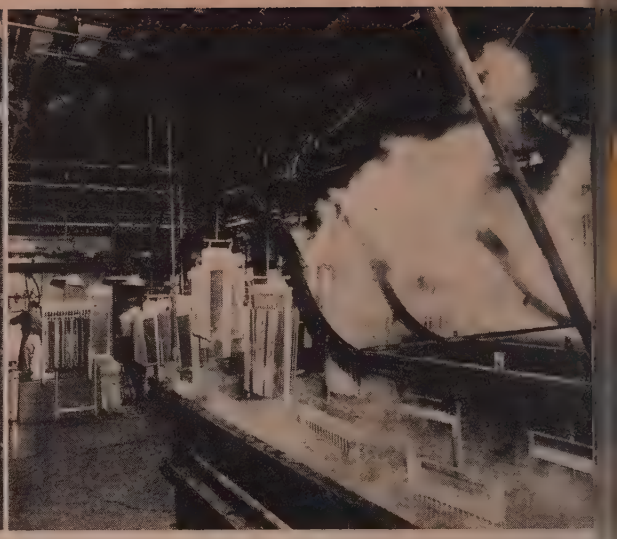




■ *Two views of Kawneer Co. operations at Cynthiana, Ky., plant illustrate the main activity here — production of home refrigerator aluminum shelving, trays and trim for various manufacturers. Left photo shows center bar crimping of two shelf halves. Right photo shows conveyorized degreasing, a cleaning step prior to anodizing. Cynthiana is a versati fabricating plant, equipped to do punch press work, wi forming, roll forming, painting, anodizing and welding. Pr duction of aluminum grilles for the Lincoln and parts f Chrysler is a fairly recent expansion at Cynthiana.*

mat actuated and wired for standard 115v., 60 cycle power.

The complete operating device is held in a 4½-inch square tube concealed in the top frame, thus maintaining the door's clean, slim lines. All wiring is in the door frame, ready for connection to the power source.

Because operation is completely electric, the system doesn't require hydraulic motor, pump or compressor. The simply designed yet rugged entrance units are installed in supermarkets and other high traffic buildings.

The other new door is a self-closing unit operated by a hydraulic cylinder of Kawneer's own design. Like the automatic control, this mechanical closing device is concealed in the door's overhead cross-piece. These integral devices are not sold independently.

"New architectural products are usually accepted very slowly," Witwer commented. "At the outset they often give the impression that they're going to be dismal flops. But the speed with which these new doors took off was breath-taking."

A new optional decorative feature on Kawneer wide or narrow stile doors is a beveled glass stop of porcelain enameled aluminum in Sunset Red, Sunlight Yellow, Teal, or black. These glass stops can be used in combination with metal door pulls having grips of the same color to provide a pleasing color accent for certain types of shops.

Kawneer has also introduced aluminum wall units in four price categories. Primary advantage of the new Unit Wall systems is that they give architects wide design latitude within the fixed dimensions of the product. The fact that they are production line items makes them particularly economical.

"We think that these walls should be able to take care of a great majority of markets that are developing in the commercial and institutional fields," Witwer said.

The architect has the option of standard or custom-built curtainwall units, plus the benefit of Kawneer's experience with structural materials such as aluminum, bronze, stainless and others; color anodized and mechanical finishes, plus porcelain enameling, mosaic, plastic or vinyl; and the complete range of sealants.

Provision for expansion and contraction due to seasonal conditions, as well as allowance for wall movement are engineered into all Kawneer wall systems. The company will assume single responsibility for a curtainwall job from detailing and engineering to erection and glazing.

Accent Standardization

"Our whole concept of the building products industry is different from most others," Plym said. "We are striving to promote greater acceptance of standardized components—more factory fabrication, less job-site fabrication. While we do a good deal of custom fabricating, our competition does relatively more."

"We welcome the big custom curtainwall jobs, but our research and development work is based on standard units that are ready for installation when they leave our plant."

Plym pointed out that Kawneer's four metal wall systems introduced this year still allow the architect satisfactory design latitude.

"He can still juggle them aroun and regardless of the design he com up with, he will benefit by basic e gineering principles embodied in the Engineering is a mighty important a tivity around here; we probably spen twice as much on R&D as all of ou competitors put together."

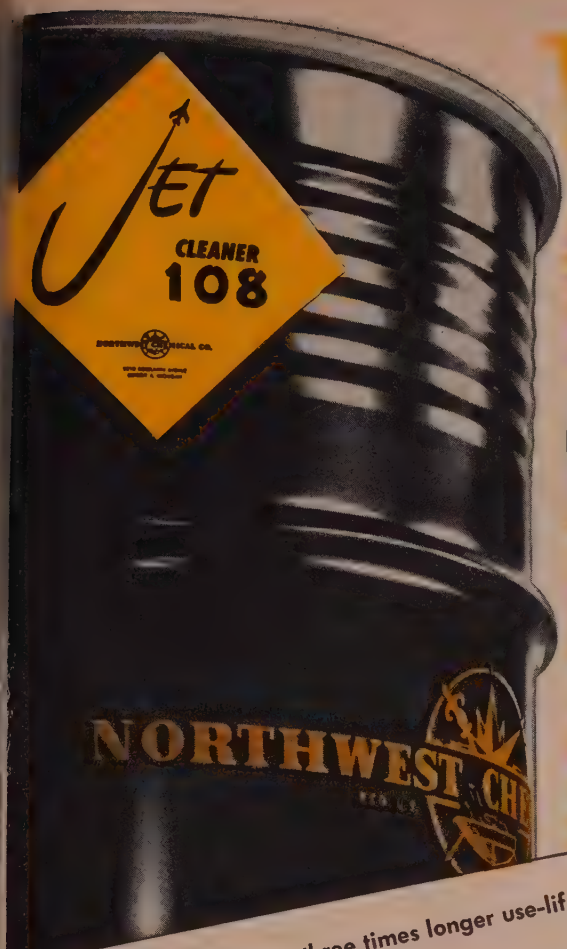
Two other factors will bear on Kaw neer's performance in 1960: The build ing market, and the company's bridg to that market — its dealer force.

Economist Miles Colean, writing fo *Architectural Forum*, forecasts contin ued expansion of construction gene ally, including substantial growth i the non-residential building field. Pri vately financed commercial building, in cluding office buildings, stores, restau rants, warehouses and garages, is ex pected to increase 7.6% ($4.6 billion next year. School building, Colean esti mates, will increase about 3% to mor than $3 billion.

Factory building, recovering from it two-year relapse, is expected to exceed $2.7 billion, an increase of 17% over 1958. Other types of private and public non-residential building — hospital, recreational, public administration and service, etc., will contribute to the advance in varying degrees.

How well equipped is Kawneer to get an increasing share of a growing building market in 1960?

"We have 75 full-time field salesmen developing the dealers' business," Plym said. "Our dealers are largely glass jobbers who stock our products. We have about 1200 of these fellows in the U.S. No other manufacturer in our line of products has this kind of coverage."



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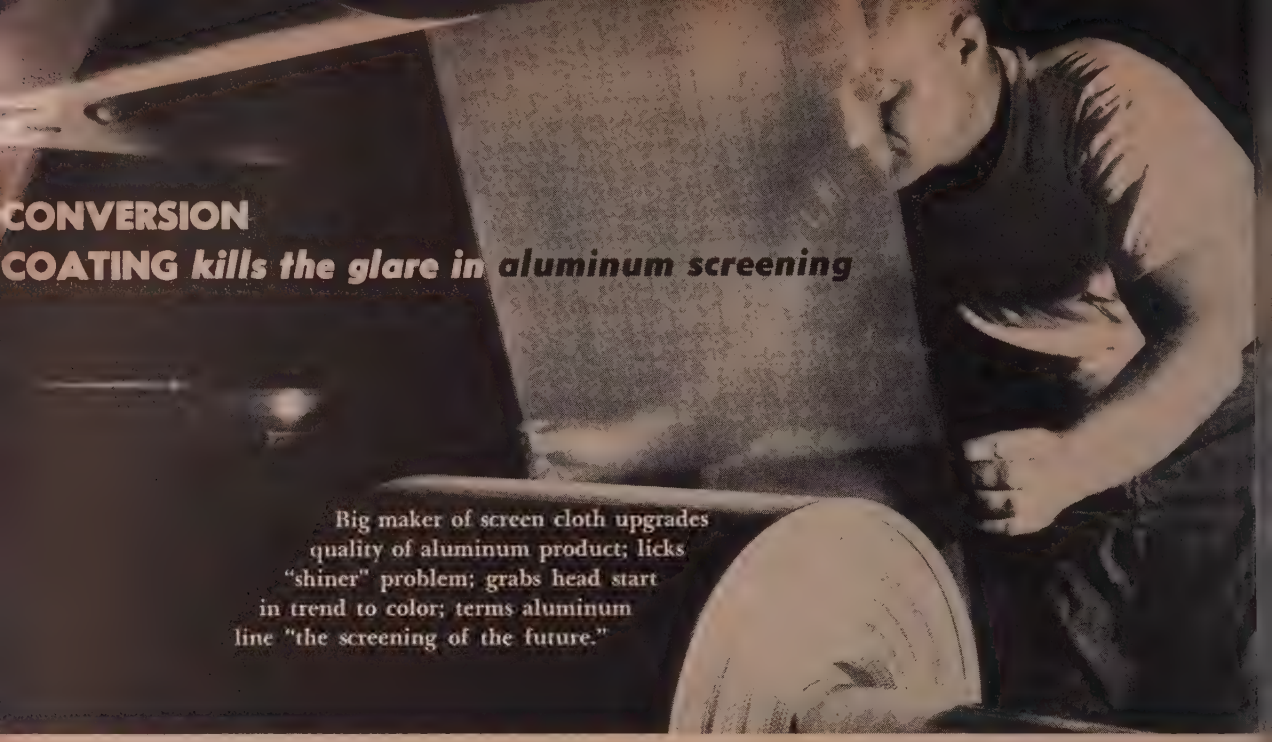

CONVERSION COATING *kills the glare in aluminum screening*

Big maker of screen cloth upgrades quality of aluminum product; licks "shiner" problem; grabs head start in trend to color; terms aluminum line "the screening of the future."

COMPANIES that manufacture aluminum-framed screens, screen doors, combination storm windows and doors, jalousies and the like generally prefer to use aluminum screen cloth. Most of the aluminum screening made today is supplied in the natural metallic finish, but this picture should change rapidly as more and more building product manufacturers upgrade their aluminum lines by adopting protective or decorative finishes.

One maker of screening that will have a jump on the trend toward color is the Hanover Wire Cloth Division of Continental Copper & Steel Industries, Inc. About two years ago, the Division's Hanover, Pa. plant installed a chemical conversion coating line that can give aluminum screening either a charcoal gray or pale green finish.

The installation employs Alodine,* the conversion coating process of Amchem Products, Inc., Ambler, Pa., and the integral coating applied on aluminum screening may serve as the final finish or as an effective base for subsequent painting. The principal reason for installing this finishing system was to produce an "improved" aluminum screening for one of Hanover's largest customers.

But the plant reaped an additional benefit: Hanover has found that Alodizing eliminates "shiners"—uncontrollable and unpredictable glaring highlights that appear in aluminum screening as it is woven. Though "shiners" have no apparent effect on the performance of aluminum screening, the resulting non-uniform sheen is considered objectionable.

Apparently, the problem has plagued all makers of aluminum screening. Exhaustive investigations—some employing slow motion movie cameras—have failed to uncover the causes of "shiners." But to the screening manufacturer, the defect means customer complaints; rejected cloth; segregation of material for a salvage operation that recovers only metal, not time and labor; delivery delays; and back-ordering for customers who expect uniform quality.

The first production run of Alodized aluminum screening was completed 18 months ago at the Hanover plant. More than 2 million square feet of the material have been shipped since then without any "shiner" rejects and without a single customer complaint.

Alodized screening presently accounts for only a small fraction of the plant's total aluminum output. But company officials consider the Alodized product "the screening of the future." Demand for aluminum screen cloth this year has been so great that the company has been unable to schedule more of its output through the 5-stage Alodizing line.

Although there is still a greater demand for bright finish screening, the men who run the Hanover plant feel that "eventually all aluminum screening will have to be Alodized or treated with a similar method."

The Hanover Wire Cloth Division is the country's second largest producer of wire screening with production exceeding 100 million square feet annually. Its seven complete product lines include bronze and stainless steel screening in addition to aluminum. Last year, the company installed a new aluminum rod drawing mill, thus permitting the production of fine wire from rod rather than intermediate size wire.

How Screening Is Made

The production of aluminum screening begins with 220-pound coils of No. 5 (3/8-inch dia.) aluminum rod, received in strapped 10-coil bundles for lift-truck materials handling convenience.

At the new aluminum rod drawing mill, the aluminum rod is electric welded to provide continuous lengths which are fed to Vaughn rod break-down equipment. The first pass reduces rod diameter to .187-inch. The wire is then annealed at 450°F and subsequently broken down on an intermediate machine to .064-inch diameter. Annealed again at 450°, it is then drawn from .064 to weaving size .013 fine wire.

The fine wire is then normalized to remove any brittleness and moved to the weaving department where warp drums are wound and placed on the looms. Improved Kintzing looms (Hanover started with 100 of these 55 years ago) operate at 65 "beats" per minute. Screening is also woven by a battery of Warner & Swasey Sulzer weaving machines operating at 240 "beats" per minute. Hanover now has more than 4½ times as many looms as the original operation and employs 350 people.

The woven aluminum cloth is then moved to the finishing department,

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where Alodizing can be accomplished in the 5-stage system at normal line speed of 25 feet per minute at temperatures of 105-110° F. Rolls containing 903 linear feet of screening are processed on the No. 3 line (Hanover has 4 lines) which is designed to permit Alodizing. This line can also be used to process regular painted aluminum screening by having the material bypass the Alodizing process tanks via a straight-line overhead route roller system to the aluminum paste-varnish tank.

Screen cloth that is to receive the bright aluminum finish is first cleaned in a solution of detergent, then steam heated, rinsed, dried and dipped into a tank containing aluminum pigmented varnish. Finally, it is dried by infra-red burners.

Screening that is to be Alodized is processed in a polyethylene-lined tank. Stainless steel rollers are employed in this case. At the end of the line, Alodized screening is roller-dipped in clear lacquer. Excess lacquer is removed by a vibrator, and the screening is dried by infrared-type burners prior to moving on to rewind roll. As the material exits onto the roll, it is inspected by an operator.

Plan Tandem Operation

Tandem roll operation is planned through the Alodizing process since tanks are wide enough to accommodate two rolls of the material. Automatic chemical feed is planned. The Alodized rolls are moved to the packing department, where they receive final inspection, are cut and packed in 100 and 300 foot lengths.

Alodine is delivered to the Hanover plant in convenient liquid form to eliminate mixing powder on the scene.

According to E. B. Frock, Continental Copper & Steel's vice president in charge of the Hanover Division, "Alodizing can accomplish the preservation of aluminum screening in our business." The aluminum producers realize that aluminum is not the perfect metal for screen cloth, he contends, but Alodizing is the answer to the problems.

"Eventually, all aluminum screening will have to be treated before it is painted or finished," he adds. "Consider the significant fact that many storm window and screen fabricators have already gone to Alodized aluminum frames for quality improvement."

Hanover, out in front as the first in the field to Alodize aluminum screening, intends to maintain this position. While still producing non-Alodized screening for which there remains a demand, the company sees a bright future for its no-glare, corrosion-resistant Alodized wire cloth.

The product currently carries a premium price tag, but the company hopes that increasing volume will eventually enable it to offer Alodized material at the same price as standard finished screening.

"I don't think it's going to replace the bright aluminum altogether," explains one company executive. "A certain amount of people are going to use bright aluminum, regardless. If we can put the bright finish on Alodized screening, then I'll go along with the opinion that Alodizing can be extended to 100% of our aluminum screening."

Largest customer for the product is the leading mail order retail concern that originally asked Hanover to develop an "improved" screening. This customer had suggested anodized screening, but production officials at Hanover had been discussing Alodizing with representatives of Amchem products at the time.

A trial run was ordered, and the results are reported in a June 1957 laboratory report from the customer's extensive testing facilities. The report said, in part: *"The results of accelerated laboratory tests indicate that the Alodized finish on this sample of aluminum screening offers very good resistance to salt, fog, high humidity and fading for the intended use. It exhibits better physical properties than most good outdoor organic finishes."*

"Significantly, this customer has just indicated their intention of going entirely to Alodized aluminum," declares Frock. Significantly, too, the customer laboratory almost simultaneously tested — and turned down — a vinyl-coated aluminum screening.

Backing up the original decision to introduce Alodizing was a more recent independent U. S. Testing Laboratory report, indicating impressive corrosion resistance of Alodized screening.

Customers Like It

Favorable responses from the field are some indication of customer acceptance of Hanover's Alodized screening and the improvement of their geographical distribution position.

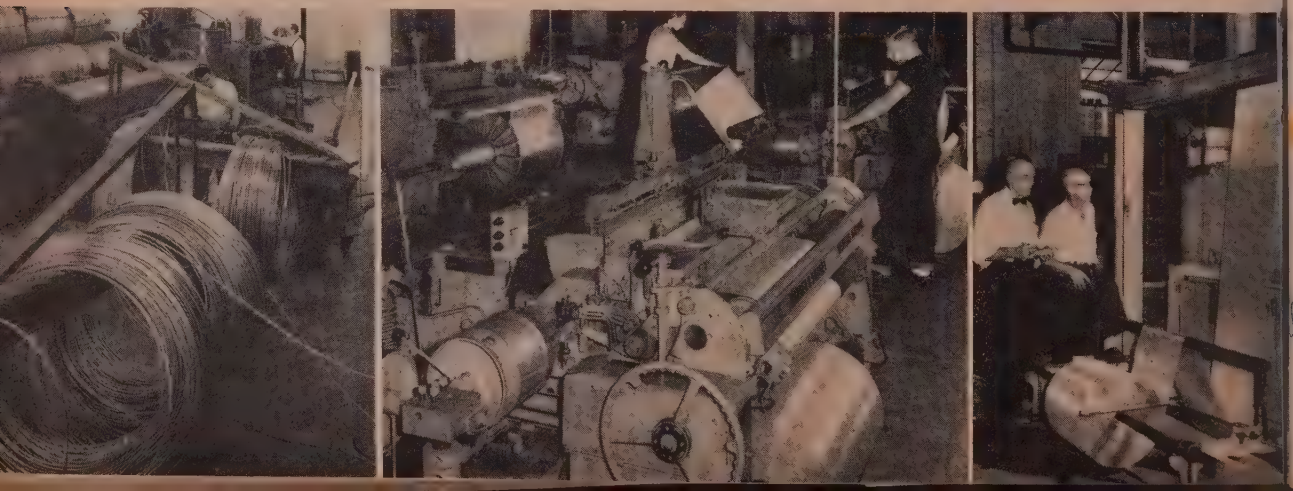
A Daytona Beach, Fla., merchandising outlet with a previous record of "initial order, no repeats" on screening was stocked completely with Alodized. This customer has re-ordered three times. This is in a seashore exposure area.

California orders are heavy, with the soft green Alodized color credited here for the increase due to the aesthetic characteristics of the screening that has extended its use to swimming pool, patio and carport enclosures.

(Both Florida and California are areas that previously preferred Fiberglas.)

In New Jersey, a customer who has used Alodized screening on beach houses is reordering. Another, making screens for an Asbury Park hotel, used Alodized exclusively.

On the eastern Maryland shore, a wholesaler has switched from bronze to Alodized aluminum, and reports that "results have been excellent."



■ ***Production of aluminum screening at Hanover begins with coils of No. 5 rod which are welded into continuous lengths then drawn down to .187-inch wire (left). Second draw cuts diameter to .064-inch. Wire is then normalized, wound on warp drums, and woven into screen cloth (center). Cloth then goes to finishing department where it may go through 5-stage Alodizing line (right) at 25 feet per minute.***

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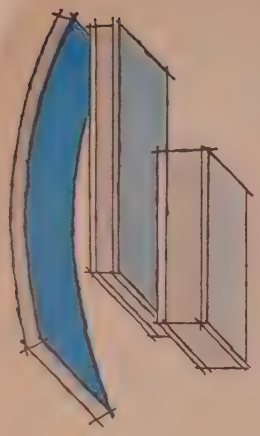


PORCELAIN ADDS COLOR to aluminum sandwich panels

Technological advances in enameling procedures and frits for aluminum expected to spur use of the light metal in sandwich panels for both interior and exterior building applications. Mirawal employs continuous porcelain enamel method; maintains strict test, quality control program.

by John T. Gartrell, General Manager, Mirawal, Birdsboro, Pa.

ALUMINUM has found tremendous usage in the construction industry. It is a serviceable basic material with a seemingly unlimited array of end uses. In recent years, since the advent of curtainwall construction, the use of aluminum in building has increased ten-fold.

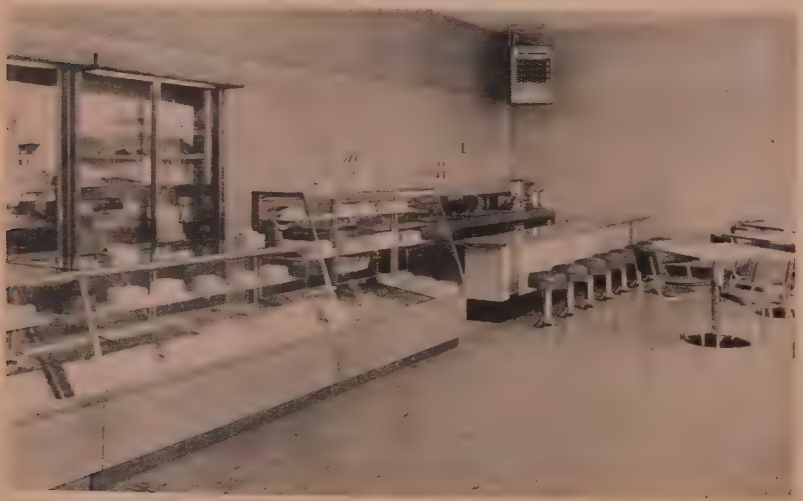
Perhaps its increased usage is attributable in part to improved dissemination of technical data to architectural designers and specification writers. An outstanding promotional job has been done by the aluminum industry. Numerous advances in extrusion presses, rolling mills and other production equipment have also played an important role.

We are now in the "aluminum age." What better testimony is there than the thousands of miles of aluminum storefronts used throughout this country? No other nation has utilized aluminum in such vast quantities for construction.

For many years, the Mirawal sandwich panel process has led the field in its specific industry. Millions of square feet of these porcelain enamel faced sandwich panels have been produced for use in the U. S. and abroad. As this country's original sandwich panel manufacturer, Mirawal has manufactured and field-tested every conceivable laminate combination for sandwich panel construction.

Two Types of Panels

Sandwich panels generally fall into two basic categories: Thin-type or veneer panels; and insulating panels. Veneer panels consist of adhesive bonded materials in which solid cores are used (see sketch). These panels range from 1/8 to 5/16 inch thick, and are made in standard widths of 24, 36, 42, and 48 inches, and standard lengths of 4, 8, 10, and 12 feet. They are produced for specific interior or exterior applications.



■ *An interior installation of Mirawal sandwich panels with porcelain enameled aluminum face — in this case the sales room of the Falley Bakery, Topeka, Kan. Porcelain enamel is jade green. Porcelain's cleaning ease is big advantage here.*

Oil tempered hardboard is usually employed, but cement asbestos sheet has gained in popularity during the past two years — mainly because of its greater fire resistance. A wide range of surface laminates are employed, the most popular being porcelain enamel on steel. However, anodized aluminum, stainless steel, bronze, and plastics are also used in great abundance. Moisture seal laminates for the inner side of such panels include galvannealed steel, aluminum foil, patented sealants, etc., depending upon the end use of the panel. Flexible core materials are also available where curved laminated panels are required.

A popular application of this type of panel is the use of identical facing materials when the panel is used in partitions or glazed into standard sash units.

Insulating sandwich panels provide flexible design features (see sketch). This type is generally custom made to the specific job requirements, but it is available in standard thicknesses ranging up to 2 inches.

A wide variety of core materials may be used; each has specific advantages, depending upon the end use of the panel. In fact, over 40 commercial core materials are available. These include plastic, glass, perlite, wood fiber, and numerous patented compositions.

While this type of panel is sometimes made up to four inches thick, most panels are less than two inches thick. The most popular surface laminate for core materials is cement asbestos board, pressure adhesive bonded to both sides of the core to form the basic sandwich. Any of the face materials previously mentioned may be bonded to the basic sandwich.

Adhesive bonding of sandwich building panels is a highly specialized business and should not be undertaken by anyone not fully trained and equipped

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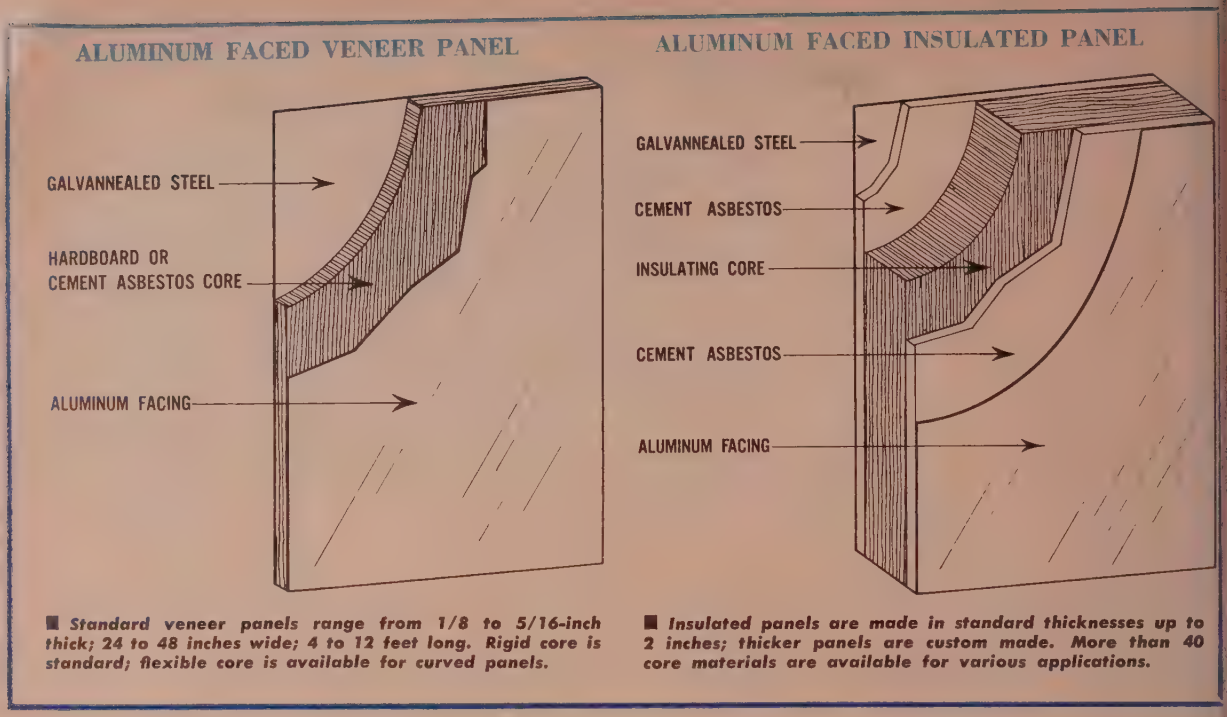

■ *Standard veneer panels range from 1/8 to 5/16-inch thick; 24 to 48 inches wide; 4 to 12 feet long. Rigid core is standard; flexible core is available for curved panels.*

■ *Insulated panels are made in standard thicknesses up to 2 inches; thicker panels are custom made. More than 40 core materials are available for various applications.*

in this field. There are numerous qualified laminators who will guarantee their products against delamination for ten years or more. This, plus the sizable investment for automatic laminating equipment, generally discourages novices from entering the field.

Qualified laminators have generally developed their own secret processes and adhesives, and maintain continuous laboratory testing programs for keeping accurate check on the expectant life of the adhesive bond. The most popular check is the F.P.L. (Forest Products Laboratory) Test. This accelerated aging test gives advance notice to the laminator of the quality of his adhesive bonding. Samples are generally taken from each day's run and accurate records are maintained to tie in with all panels produced.

Stringent Test Cycle

The F.P.L. test exposes samples of laminated panels to a series of artificial elements designed to deteriorate the adhesive bond. The samples are a nominal square foot in size and of varying thicknesses. The sequence of the F.P.L. test is as follows:

1. Immersion in water at 120°F for one hour.
2. Sprayed with steam and water vapor at 200°F for 3 hours.
3. Stored at 10°F for 20 hours.
4. Heated at 210°F in dry air for 3 hours.
5. Sprayed again with steam and water vapor at 200°F for 3 hours.
6. Heated in dry air at 210°F for 18 hours.

This sequence constitutes one complete cycle. The absolute minimum required for satisfactory adhesive bonding is six full cycles. As each sample is rotated in the cycle, it is tested for delamination. When delamination becomes evident, one sample is removed and defined as sub-efficient or plus-efficient.

How It's Evaluated

For example, if a panel shows delamination at the end of the fourth cycle, plus three steps, it is referred to as "4—3 sub-efficient." Conversely, if the sample shows delamination after 10 full cycles plus 2 full steps, it is referred to as "10—2 plus-efficient." If the panel passes six full cycles, it is suitable for commercial use as a laminated building panel. Needless to say, specification writers should insist on panel suppliers maintaining full F.P.L. testing in their plants, and back up their panels with a ten year warranty against delamination.

The use of aluminum in laminated building panels is not new; it dates back over ten years. But it is interesting to study why the metal has not become more popular in this application.

Aluminum used in laminated building panels may have any of several types of surface finishes. The principal finishes are anodized (plain or colored) and porcelain enamel. Textured or formed sheets may also be used for decorative architectural effects and these may be anodized or porcelain enameled for protection and/or color.

Anodizing is an electrochemical process that accelerates the formation of aluminum's natural oxide coating, making the metal highly resistant to abrasion and the elements. Proper pre-treatment provides surfaces that are uniform in color and free from streaking.

Anodized aluminum may be plain (i.e., the natural hue of the metal) or colored. In the latter case, color may be imparted by a number of methods. However, the range of colors suitable for outdoor exposure is rather limited and the processes are somewhat more costly than plain anodizing. Color uniformity is often difficult to maintain and light-fastness of the color is questionable in some cases.

In addition, the more reliable color anodizing processes are covered by patents, and relatively few companies are licensed and properly equipped and experienced to handle these methods.

Porcelain Enamel Best

Porcelain enameling is generally considered the most reliable method of providing durable color on aluminum for architectural applications. Recent developments in the process itself and in the manufacture of frits have stimulated the use of porcelain enameled aluminum in construction panels, but color is still a problem.

Pastel shades are difficult to obtain, and a perfect white without off-shading has yet to be developed. Great strides are being made by the frit manufacturers, however, and it is probable that numerous color advances will be forth-

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■ *A typical exterior curtain wall application employing aluminum-faced sandwich panels. The hard, light-fast, weather-resistant properties of porcelain enamel enable designers and architects to incorporate durable color in such aluminum-faced panels.*

coming. Porcelain enameled aluminum offers certain distinct advantages:

1. It may be sheared, cut with abrasive, band or hack saws, drilled or punched with only minor marring, and the exposed edges are not subject to subsequent discoloration by oxidation.
2. It has excellent impact- and flex-resistance, plus high resistance to thermal shock.
3. Many surface textures and colors are available.
4. Chemical resistance is comparable to that of enamels used on steel.
5. Aluminum sheet can be porcelain enameled on one side only, leaving the back side exposed for welding.
6. Lighter shipping weight.
7. Resistance to voltage breakdown.

Aluminum offers many advantages as a facing material for sandwich panels, but it also has disadvantages. The prime objections are its higher cost and the need for special handling. It is presumed that the cost of aluminum will eventually decrease with increased usage. And where aluminum is chosen as the desired surface material for an application, there is usually little objection to its cost.

Insofar as handling is concerned, fewer problems are involved with aluminum when it is laminated to a sandwich panel. Of course, care must be taken in the packaging of this type of panel as well as in field erection.

Mirawal employs a continuous porcelain enameling process. Only two American companies use this process, and it is expected to contribute to a wider usage of porcelain enameled aluminum in the years ahead. Recently, coiled stock was obtained from a major aluminum producer and was porcelain enameled and returned to the company for resale through its outlets.

Continuous Enameling

The process involves placing the coiled aluminum on one end of the porcelain enameling line, and threading it through the series of cleaning stages, spray booths, and ovens. The porcelain enameled stock is then recoiled at the end of the line or cut to specific lengths.

Certain advantages are obtained with this continuous process. Porcelain enameling slip is sprayed on in a uniform manner which helps prevent color variation. Constant speed of the line also promotes color continuity. Thus, each sheet is identical in color with all other sheets in the run. The color hazards of the individually fired sheet process are eliminated.

While the bulk of the material porcelain enameled by the Mirawal proces is steel, it is anticipated that improve ments in the aluminum process and frits will increase the demand for thi porcelain enameled aluminum in the years ahead.

Laminating of aluminum directly to core materials without hardboard o cement asbestos backing is generally considered risky because of the soft ness of aluminum and its relatively low resistance to impact. Among the ad vantages of aluminum laminated to sandwich panels are:

1. The problem of aluminum's low resistance to impact is eliminated when the metal is laminated to a backup board.
2. Almost all patterns and types o aluminum sheets are adaptable to lami nation.
3. Waviness of panels is eliminated Laminators maintain high speed micro sanding machines which prepare the surface prior to laminating. This pro hibits "telegraphing" of surface defects of the panel through the aluminum.
4. Aluminum-faced sandwich panel is easily cut in the field with the elec tric heavy-duty hand model Kett saw thus minimizing field adjustments.

Because lighter gauge aluminum sheets may be used when bonded to sandwich panels, considerable savings in metal costs are realized. Several large jobs of laminated panels faced with aluminum have been in service for several years with little, if any, de lamination. Thus, the thickness of aluminum sheets employed in this proc ess is not a prime consideration.

As mentioned earlier, the aluminum producers have done an outstanding job in developing technical data on aluminum and its use. In addition, the major panel laminators also are well qualified to assist in technical design problems.

Each construction design concept in troduces new problems for panel lami nators, but these problems are generally solved and aluminum's use in this in dustry is enhanced accordingly. The major portion of aluminum faced lami nated sandwich panels will probably be used in building facades and curtain walls.

It is indicated that such usage of porcelain enameled aluminum will tri ple within five years. Designers are find ing increasing use for it in hotels, res taurants, dairies, and other interior applications where sanitary conditions are important. Interior partitions with enameled aluminum facing have also become increasingly popular in the past few years.

It is anticipated, therefore, that great strides will be made in the use of por celain enameled aluminum in the years ahead.

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British architects discuss

ALUMINUM IN BUILDING

Aluminum in building was the subject of a two-day symposium held last summer at The Royal Institute of British Architects, London, England. Sponsored by The Aluminium Development Association, the symposium covered a broad range of subjects — everything from the economic case for aluminum, the standards and building codes applying to aluminum, to the use of the metal in curtain walls, roofing, windows, insulation, furniture, and transportable buildings.

The symposium was divided into three sessions, each devoted to one or more specific subjects. Session 1, for example, was general in scope, dealing with "Aluminum as a Building Material." Session 2 was confined to "Aluminum Curtain Walling," while Session 3 dealt with "Aluminum Building Applications."

The following report presents condensed versions of three of the technical papers given at the symposium. A few of the papers would be of scant interest to most of our readers because they are based on conditions in the building industry in England. The greater portion of this report is given over to two papers on the subject of aluminum in curtain walls.

Our report begins with selected fragments from an instructive, and often witty, talk prepared by M. H. Thomas, an architect in England. Some of his observations apply in the U. S. as well as in England.

THE ECONOMIC CASE FOR ALUMINUM

by Mark Hartland Thomas, Architect

I PROPOSE to interpret my terms of reference, not as having a case to make for aluminum — as if it were an unknown and questionable material requiring an advocate — but to indicate what examples in a designer's casebook have proved to be cases for the use of aluminum.

Points will be noted where the aluminum industry is not at present serving architectural needs as well as it could. But this is not meant to be the case *against* aluminum, either.

There is one general topic that must be got out of the way — corrosion. For more than 30 years an effective whispering campaign has been conducted against aluminum on the theme: "Yes, we know it doesn't rust, but it *corrodes*."

Having had to admit that it corrodes, one goes on to add that, like that of copper, the corrosion of aluminum is self-stifling. Nobody thinks of copper as corroding; it acquires a beautiful patina. So the aluminum industry is still in search of a word. Some had tried "patina," but that claims too much. The oxidation of copper makes attractive coloration; not so that of aluminum.

Corrosion Can Help

I hear that certain district surveyors will not allow damp-proof courses or wall ties made of aluminum because the mortar corrodes them. Surely this is just what one wants; the interaction of the metal and the mortar is making a bond.

I understand that the interaction normally stops when the concrete or mortar has set, but may continue to some extent in wet conditions. To what extent? It would be useful to know, so as to specify sufficient additional thickness of metal to make provision for this effect.

Then aluminum could be the metal dampcourse that does not slip. It is a pity to coat it with bitumen and make it a slippery dampcourse, no better than the others.

An Agreeable Material

I always keep a roll of super-purity aluminum by me for various flashing jobs about the house and for model making. It is an extremely agreeable material to work with. For all kinds of flashing and fully supported roofing, this soft aluminum is nearly as easy to work as lead, and behaves more like copper. It does not creep like lead, but like copper it goes back again after expansion.

If the medieval architects had possessed super-purity aluminum they would surely have used it.

In connection with roofing I must mention a small thing that I wish the industry would provide. Aluminum screws and washers and aluminum nails may be available, but they are hard to find. One would often specify them if one was sure a builder could get them in a suitable alloy and gauge. No doubt there is an interaction between aluminum and some timbers, but remember the advantage of chemical bond. The reason why a steel nail holds is partly that it rusts a little.

For a pitched roof, even a low pitch like 10° or 15°, I regard corrugated aluminum as the best of all. If you forget to bolt it down, it will take off; that is a disadvantage of the lightness of the material. But having remembered that, it should be the one trouble-free roof. There are, however, several points in this connection where the industry does not serve us as well as it should.

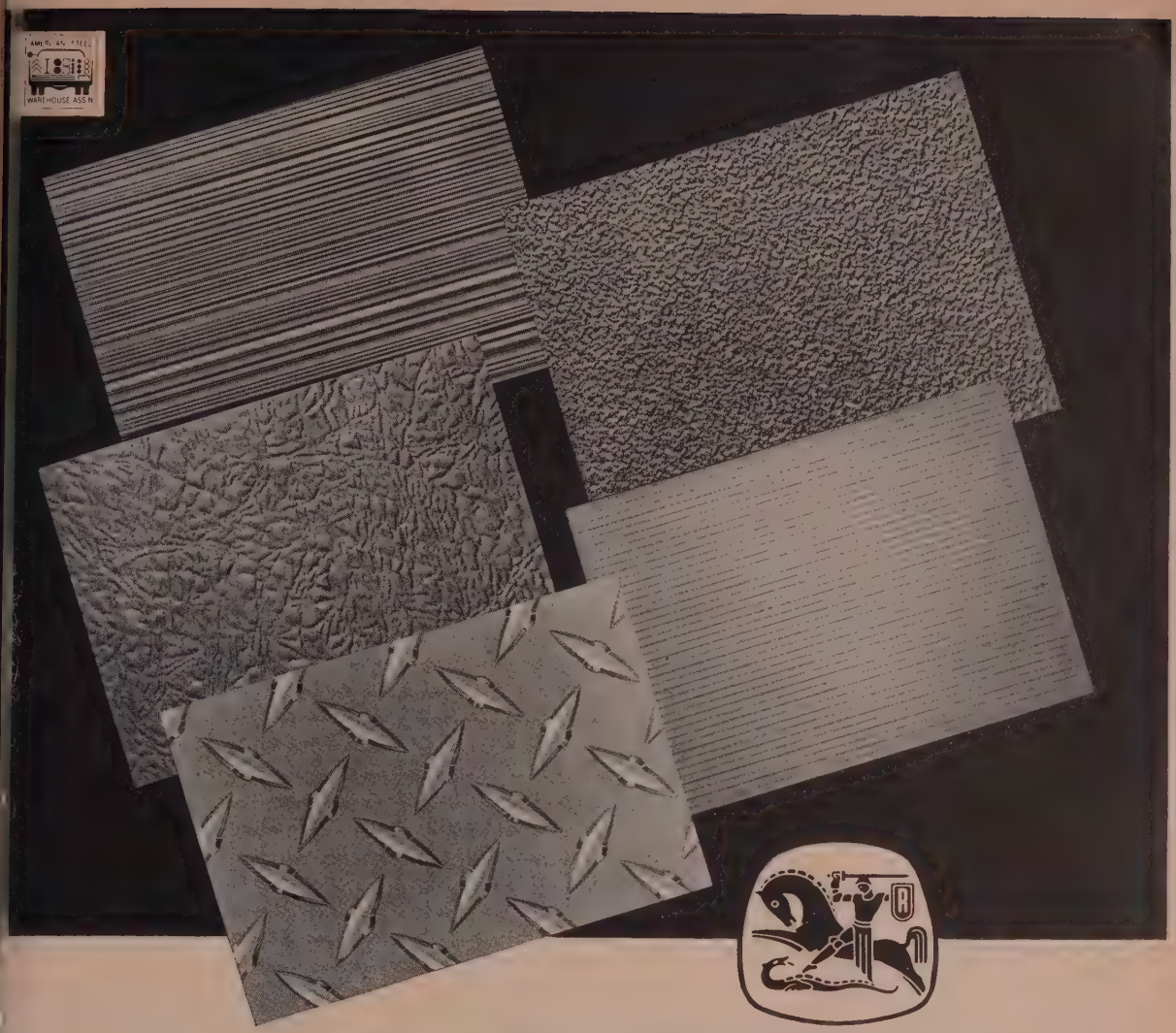
First, the difficulty of obtaining aluminum bolts. One has to use cadmium or zinc coated nuts and bolts. This is just not good enough. Owing to preferential bimetallic corrosion the cadmium or zinc will waste in preference to the aluminum, exposing the iron which will both rust and attack the aluminum. No doubt this will take a long time, but it is a worry.

More obvious is the fact that these nuts and bolts should not have to be visible and exposed to the weather. There are several proprietary designs of secretly fixed corrugated aluminum, but they are too expensive in comparison with ordinary pierced fixing. I see no inherent reason why they should be more expensive.

Poor Design Approach

A more important complaint is the incompleteness of the design of these proprietary materials. Flashings, eaves fillers, ridges, fairings to openings are either completely absent or miserably ill-conceived. I have noticed this failing of very large companies — to spend a great deal of money upon the development of some new product and then to stop abruptly with the job half done.

I have my doubts, too, about the effi-



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ciency of the cross-sectional form of most corrugated aluminum. We have moved some way from the first unthinking imitation of the profile of corrugated iron, which couldn't be right because of the different modulus of elasticity. I feel sure that there is a cross-section for corrugated aluminum that is both mechanically more efficient and provides simple secret fixing.

Elegance With Extrusions

The biggest asset of all for the designer is the readiness with which aluminum affords nonstandard sections of almost any desired shape by extrusion. One can add to the shape of a structural member parts such as flashings or trim, or rebates for panels that would normally be separately attached. One often finds that these added parts provide sufficient body of metal to do the structural job itself. This saves material and promotes elegance of design.

Dies for extrusion are not very costly; it does not take a very large job to offset their cost by the savings that extrusion can promote.

It must be remembered that an extrusion is a continuous profile. Any change in shape, or stopped ends, requires subsequent fabrication. This is often a designer's problem: One can cover the end of one extrusion by another crossing it, but in the end something has to be returned on itself to complete the detailing.

It is hard to stress too much the importance of extrusion for the future of aluminum in building. I suppose the chief use of extrusions is for windows and for curtainwalling. Most manufacturers are now using thin walled hollow sections for windows and mullions in contrast to the imitation steel sections with which aluminum windows began, and which are still the British standard.

Given a basically hollow shape, it can be formed by extrusion with all the shelves, rebates, fillets, drips and so on that the window designer requires. But in the end, something has to be returned on itself. Otherwise there is that awkward little hole in the corner which is the detailer's bane.

For shapes that must return upon themselves all the usual techniques of metal fabrication are available. The method that perhaps does not occur so readily to the designer is casting. This is very useful for all kinds of panels and overplates in which the profile must return three-dimensionally to finish the job. The shaping can be decorative or functional, or both.

The wooden patterns for sand casting are not costly, and quite thin castings can be made. Die casting is different; the tools are costly and many repetitions are needed to recover the cost. So this process does not enter much into aluminum for building, except for things like door and window hardware.

An Opening for Designers

There is a wide opening here for employing good industrial designers and making more elegant fittings, instead of importing these from Germany.

Rain-water goods are another good case for aluminum, but again one in which the design work has not been good enough. The unthinking carry-over from the cast-iron version is everywhere apparent.

Needed: Radical Redesign

What is wanted is radical redesign for aluminum. This is especially needed for the ogee eavesgutter. The standard shape has a particularly slack and dreary outline; it was not shaped by somebody who cared how it looked. I guess a committee designed it.

Much greater simplicity is required of rain-water goods. Can we not, please, have some aluminum heads that are simple rectangular boxes, with sharp edges and absolutely no beadings, mouldings or art-work of any kind? And let us exploit the big advantage that aluminum requires no painting, by offering square and rectangular pipes that fit snugly to the wall, an arrangement that is a menace in cast iron which does need repainting behind the pipe.

The guiding idea behind redesign and redevelopment of aluminum rain-water goods is that, for modern architecture, these should be as unobtrusive as possible. Aluminum has every advantage as the material to achieve this.

I would say that aluminum is now well established as an architect's material that has a large variety of useful characteristics. But there are too many loose ends in the aluminum products at present available for building.

Such are typical of the pioneering stage, but it is time that was left behind. Intensive design development to produce fully engineered and well shaped products should now be the order of the day.

ALUMINUM CURTAIN WALLS IN BRITAIN

by H. W. Johnson, Architect, The Aluminium Development Association

ONE of the most striking advances in the building industry in the past few years is the development of the aluminum curtain wall. The term 'curtain wall' describes in the broadest sense, an exterior non-load bearing wall designed primarily to carry its own weight, resist wind pressure and keep out the weather. It is usually secured to the main structural frame of the building.

To load a frame structure with heavy traditional materials in the construction of walls is unnecessary and uneconomical, as many materials such as aluminum can be used to form thinner, lighter walls, thus imposing minimum dead load on the structure and foundations.

The curtain wall is one of the more important manifestations towards the industrialization in building. Most of the time and labor required to produce the walls are spent inside the factory where the best use of machines and manpower is made.

Speed of erection is another advantage of curtain walls, particularly in large multi-story buildings where quick occupation is of paramount importance.

Curtain Wall Provides . . .

Whatever system of curtain walling is used it may be required to provide a weathertight cladding, thermal insulation, sound insulation, fire resistance, electrical and other services.

In modern curtain wall elements, the spandrel and other panels consist of many types of materials, including aluminum sheet or extruded shapes. The possible combinations of types are limited only by the imagination of the architect or designer.

Many finishes, color and relief possibilities may be had in aluminum, from dark grey to the brighter satin finish, or combinations of these finishes.

Sheet is widely used for infill panels particularly on industrial buildings. Sheet may be embossed, ribbed or pressed to give texture and rigidity and in a variety of corrugated patterns.

Extrusions are generally used for mullions, transoms, sills and heads of grid elements, and for window and infill panels. A major advantage of the ex-

(Continued on page 58)

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A 63S Alloy aluminum extrusion, actual size, extruded on a 14-mandrel die. Samples of this extrusion on request

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trusion process is the almost unlimited variety of profiles. Long lengths can be produced, and widths are easily built-up by interlocking grooves to form very large panel-size units.

To Allow for Movement . . .

In design of the principal joints in curtain walls allowance should be made for thermal movement between the panel and grid-frame, and between the grid-frame and the main structural frame. Apart from the variation in heat capacity, the grid-frame will be much more exposed to external influence than will the main structure.

It is apparent that in a continuous frame-grid for a large building the total movement relative to the main structure may be considerable. Allowance for such movement must be made. Failing some provision in this respect, the grid-frame should be designed in units of suitable size to keep relative thermal movement to a minimum.

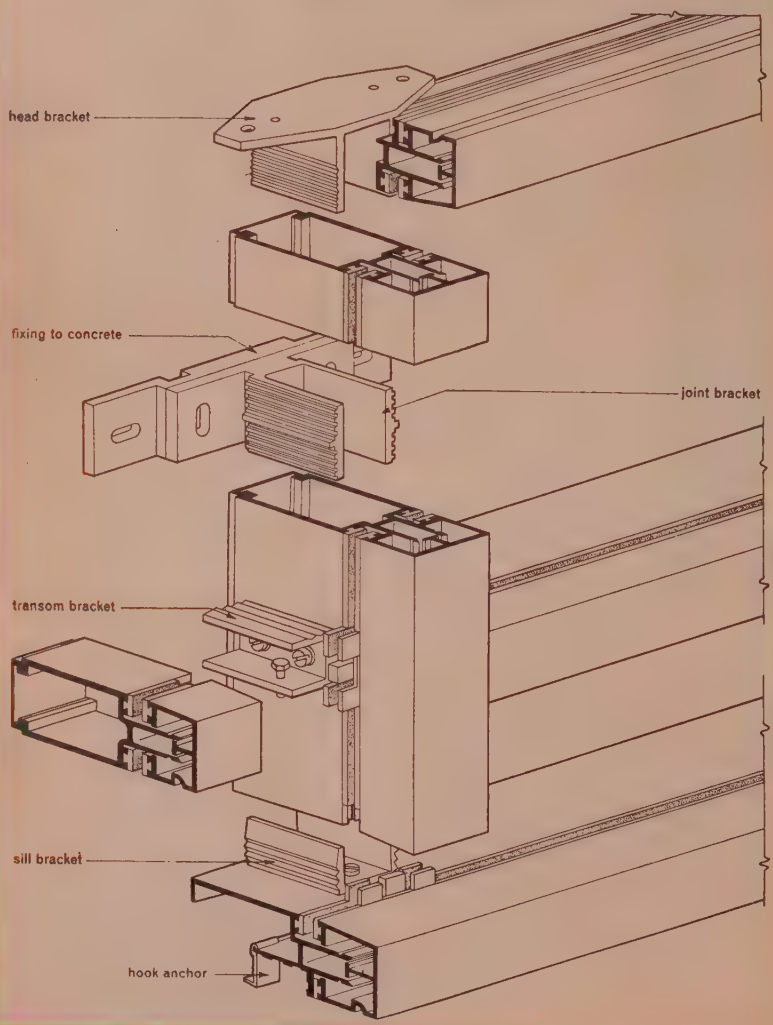
A problem is created in the edge fixing of glass in curtain walls. We have been led to understand that cracking is caused by inadequate tolerance between the glass and the frame. Experience has shown, however, that cracking is the result of unequal expansion in the glass itself, caused by the edge shielding of the metal frame.

Experiments have proved that two essential factors are the amount of edge cover, and sound edge condition of the glass.

Some architectural critics have expressed dismay at the advent of the curtain wall which would, they fear, result in buildings all looking alike.

Visual analysis of curtain walls in this country and abroad discloses certain trends and defined categories which should reassure anyone who is unduly worried on that account. There is a fairly wide choice open to the architect. If curtain wall buildings do begin to look similar in appearance, it will be from the architects' or designers' choice and not as a result of technical limitations.

THE GLASS-SPAN CURTAIN WALL SYSTEM
Ajax Architectural Products Ltd.



Three British Systems

Whilst much work is still to be done in research and the development of curtain walling in this country, progress in this field is well advanced and in the light of recent developments it is useful to consider the following systems.

The Glass-span curtain wall of Ajax Architectural Products, Ltd. is formed entirely of aluminum, left natural finish or anodized. The system permits the use of a very wide range of profiles. Mullions and transom consist of extruded aluminum sections with a front capping or facing section.

The back structural portion is of high strength alloys to accommodate imposed loading, and the front facing is of higher purity metal which can be given a superior natural finish, or anodized and dyed. Mullions are available in 2, 3, and 4 inch widths.

Glass or infill panels inserted into the sections are sealed by flush inset sealing strips of Neoprene set into the mullions, transoms and capping sections.

Transom-to-mullion assembly is by means of a specially designed aluminum transom spigot bracket bolted to the mullion; the hollow section of the transom slides over the spigot to provide a connection between the two members.

Mullions are fixed at the head and sill by a head bracket and sill bracket. Fixing to concrete floor is by a joint bracket. All spigot joints for head and sill fixing, joints between mullion and transoms, and fixing to concrete have serrated faces and are designed to hold non-setting mastic, irrespective of thermal movement. All spigot back-fixing plates have elongated holes to accommodate thermal movement.

Another important feature of this system is that continuous channels carry away condensation in the mullions to the exterior of the curtain wall.

Exterior aluminum sections can be supplied highly polished, anodized, natural, or dyed. Aluminum structural members are normally finished on the interior face to match the interior decorations, or left in natural finish.

Glass or infill panels are inserted externally and secured by external capping member which has a special internal clipping arrangement. The wide range of infilling panels includes large panels of plate glass, and composite panels in a wide variation of design and color. Panels up to 10 square feet are quite practicable.

(*Continued on page 60*)

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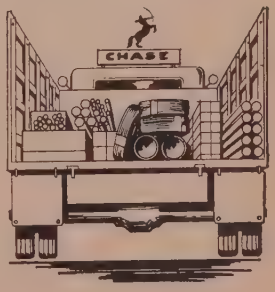

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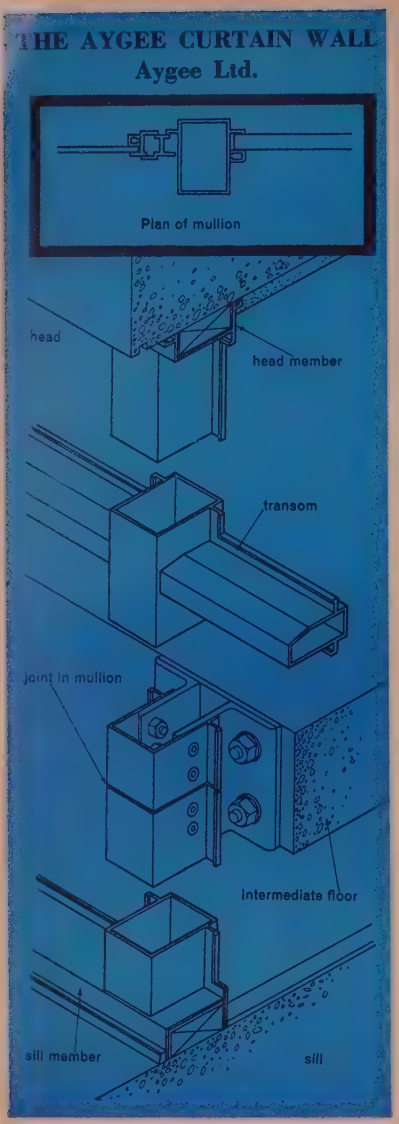


The Aygee curtain wall of Aygee Ltd. is not a standard modular system, but is designed to suit each particular installation. Mullions consist of aluminum channel with glazing flanges forming a top-hat section. The size generally used is 3 in. deep by 2⅝ in. wide. The depth is increased to accommodate floor to floor heights of 11 feet or more, according to module and statutory requirements of wind loading dependent on height of building.

The open channel of the mullion may be used to secure partitions, or sealed off with a cover strip. Piping or electrical services can also be installed in this space.

The aluminum transom, which is of similar top-hat section but 1½ in. wide on face, incorporates a combined run-off and drip, and provides a means of fixing for internal window boards.

Head, jamb and sill are also of aluminum, and are usually of a special channel section which incorporates a nib for external pointing and nib for internal plaster key.

Mullion connections are generally by means of angle cleats bolted to the floor. Head and sill connections are aluminum alloy castings slotted to permit longitudinal expansion. Transom-to-mullion connection is similarly designed, but with grooves for mastic bedding and pointing.

Where intermediate mullions are installed between the main mullions, and aluminum or steel flat or cruciform section is used. In the case of steel, this is covered with an aluminum strip.

The opening lights are screwed to mullions and transoms; fixed areas are generally glazed directly to the flanges provided in the sections, or may be glazed in a metal window insert. Window fixing and glazing is from outside.

The types of infill panels include aluminum faced Asbestolux; Muroglass; Vitroslab. The panels are positioned against the flanges of mullions and transoms and secured by metal glazing beads.

In the modern office building for the Dolphin Development and Management Co. Ltd., the main aluminum mullions are extruded top-hat section at 12 ft. module located by steel 'L' section pieces at transom level, presenting a continuous unbroken mullion effect from the top coping or capping to lowest sill level. The mullions are in 10 foot lengths and provided with a thermal expansion joint of ⅛ inch at each floor level.

Intermediate mullions are steel with a rolled aluminum capping piece in 16 s.w.g. aluminum alloy. This capping piece is secured in position by the metal windowframe fixing units.

The transoms are in 3 foot 10 inch lengths, positioned 11⅜ inch below floor level; they are joined to the main and intermediate mullions by special die cast transom units. These are secured by four fixing bolts of stainless steel. The spandrel infill panels are of Muroglass. Also provided is an Asbestolux strip, 5 inch wide by ½ inch thick placed on the inside of the transoms and secured to the concrete floor as a means of fire protection.

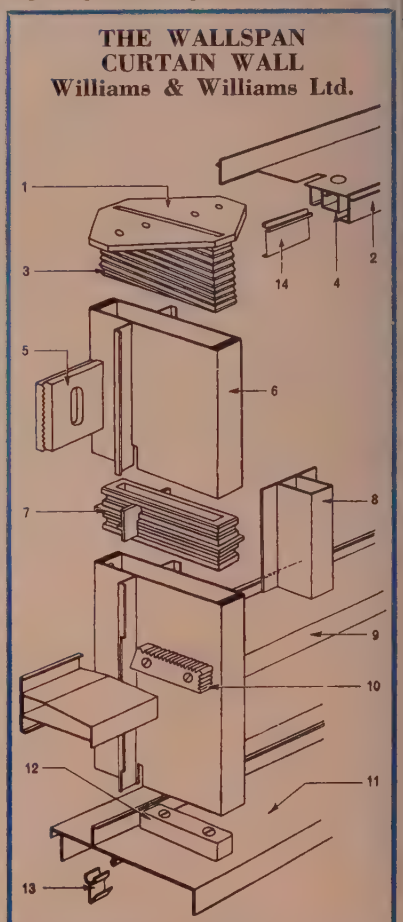
The Wallspan System

The Wallspan system of Williams & Williams Ltd. is designed for application to conventional steel and concrete framework. It consists of hollow extruded aluminum mullion and transom units fixed together to form a grid. The elements may be combined in various ways, as dictated by the requirements of the installation, permitting freedom in design and elevational treatment. The auxiliary components — fixing lugs, joining spigots and other fastenings — are generally standard.

Mullions are extruded aluminum box sections in three sizes: Approximately 9 by 1 inch for vertical spans up to 20 feet; 6⅝ by 1 inch for spans up to 15 feet; and 5 by 1 inch for spans up to 11 feet. Mullions can be spaced to any desired module up to a maximum of 5-foot centers.

Aluminum vertical muntin members are used when required to subdivide the main module, as when there is a large spandrel panel, or for a special window arrangement. All mullions and muntins have a glazing flange in the design.

Transoms are also aluminum box sections in three sizes — 4-15/16 inches; 3¼ inches (two types); and 2 inches deep, according to thickness of infilling materials used. All transoms have glazing flanges and drip bars, and two types



■ ***Components of Wallspan system: 1. head spigot; 2. head section; 3 grooves to hold non-setting mastic despite thermal movement; 4. extended aluminum glazing bead chipped into position over stainless studs; 5. floor fixing; 6. mullion; 7. mullion joint spigot; 8. vertical muntin; 9. transom; 10. transom spigot with grooves for maximum mastic adhesion; 11. sill section; 12. sill spigot; 13. hook anchor, usually embedded in concrete at sill.***

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have a top-tapered run-off for use when the infill panel or window does not engage the full depth of the supporting transom.

Choice of mullions and transoms depends mainly on three inter-related factors: Design considerations and aesthetics; wind load and dead-load for a particular span; thickness and weight of infilling panels.

Transoms are joined to mullions by means of an aluminum spigot, screwed to the mullion over which the transom fits. All spigots for head fixing, joints between mullions, and transoms have serrated faces designed for bedding a non-setting mastic and to allow for thermal movement.

The aluminum extruded head is designed as a non-load bearing member, and is normally screwed to the fixing plate of the head spigot. A small flange on either side provides for mastic sealing. Each head member spans the interval between one pair of mullions.

The sill member is fixed to the main concrete sill by aluminum hook anchors, and these slide on a cylindrical extrusion underneath the sill member. They are normally placed at 2 foot 6 inch centers. The anchors are accommodated in holes or a continuous trough made in the concrete sill. The aluminum sill member is bedded in semi-liquid hardening grout. Alternatively, the sill member may be drilled and screwed to a timber fillet set into the concrete sill.

All types of metal windows can be fixed externally against the glazing flange. For fixed lights, glazing is usually direct to this flange. Components and grid can be modified to accommodate various inserted types of windows, including horizontal sliding and double hung.

A wide range of infilling panels suitable for use with this system include plate and wired cast glass, asbestos composite panels, aluminum-faced panels, steel-faced panels, and decorative panels giving a wide choice of color, texture and insulating value.

Infillings are secured by an extruded aluminum glazing bead, held in position by stainless steel spring clips screwed at intervals to mullions and transoms. The bead has a rebate at its inner edge to hold non-setting mastic.

Aluminum angle corner plate for weathering corners, special head and sill members, and angle sections for closing the space between mullion and masonry jamb are all included in the accessories designed for this system.

Infill Panels Include . . .

Important related problems in the design and construction of a curtain wall frame arise in the design, the manufacture, and the application of infilling panels. Because of these problems, the correct choice of materials, among a wide range having different, but established, characteristics, is crucial.

The factors to be taken into account fall into two groups: (a) Properties of the materials in relation to fire resistance, thermal insulation, acoustics, durability, and permissible size, weight and thickness of panels and composite panels according to the adaptability of the structural grid to house them; (b) modules, aesthetics, thermal expansion, type of finish and replacements.

Many of these factors cannot be determined for a specific material, but must relate to one another and to the system as a whole.

The infilling materials can also be classified, and the more important groups are: External facings; internal linings; insulating materials; composite types.

DESIGN OF ALUMINUM CURTAIN WALLS

By J. B. Dwight, Civil Engineering Dept., University of Birmingham

THE external skin of a multi-story framed building accounts for perhaps a fiftieth of the total cost, and has an entirely disproportionate effect on the final impact. The advent of lightweight, factory-made units as the standard material for outer walls, although small among many technological advances, is the main factor responsible for the new architectural style.

The three often-quoted advantages of curtain-walling are that it is lighter, stronger and more quickly erected. In fact, all three are largely offset by the need for a separate fire-wall; it is difficult to see a clear-cut technical argument in favor of curtain walls.

The real reasons why architects and the public enjoy curtain-walling are less tangible. The new construction expresses the spirit of our times, both in its appearance and the very idea that to clothe a building in factory-made units is right. In the past, weight was regarded as good in itself — it stood for value.

We are now moving towards a time where weight is no longer what matters, and it is inevitable that in this transition aluminum plays a leading part.

Most curtain wall systems use aluminum for structural grid, not for its light weight, but because:

1. Architectural aluminum is a permanent material which will last as long as the rest of the building without maintenance and under the worst conditions of exposure.
2. It is easier to extrude into thin intricate shapes than any other metal.
3. It is not unduly expensive.

Aluminum would be better for the job if its initial clean finish were more permanent. Nevertheless, it provides an entirely durable construction which is only about 10% more expensive than a curtain wall having an all-steel grid. Bronze and stainless steel are far costlier and do not offer the same ease of extrusion.

What Are the Problems?

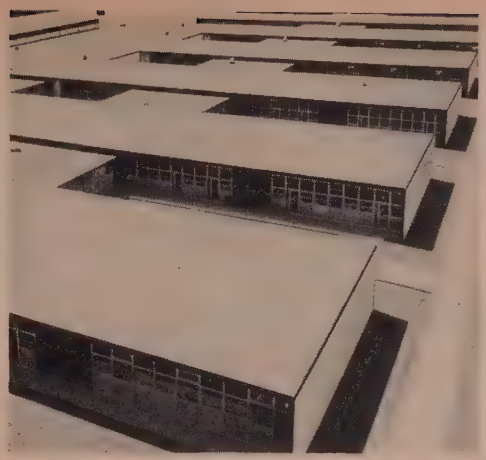
It might be supposed that the satisfactory application of a factory-made wall to a framed building would be relatively easy. In fact, curtain walling is full of problems of its own. This paper is an attempt to list these problems, with special emphasis on those that are critical in aluminum.

When heated through 100°F, an aluminum bar 10 feet long extends, if unrestrained, by 0.15 inch. The expansion of glass is the same; steel and concrete expand half that amount. A temperature of 100°F is not unreasonable for aluminum curtain wall framing to undergo (it may be more if the bars are black anodized), whereas the main frame of the building will vary relatively little in temperature and therefore suffer negligible change in dimensions.

Any attempt to bolt the curtain wall rigidly to the frame will result in severe thermal stresses. If change in length is fully resisted, the induced stress in an aluminum bar due to a temperature change of 100°F is 5.5 tons/in.^{2}, or half the proof stress of the alloy normally used for an aluminum curtain wall grid. This, added to the normal working stresses, would be intolerable.

It is therefore essential to design the grid in such a way that it can expand and contract freely in relation to the main frame. This is the curtain wall designer's major headache, involving the provision of frequent expansion joints, horizontally and vertically, all of which

Engineering laboratories at the new Convair (Astronautics) plant, San Diego. All exterior aluminum is protected against atmospheric staining and oxidation with a clear, colorless coating of Butyrate lacquer.



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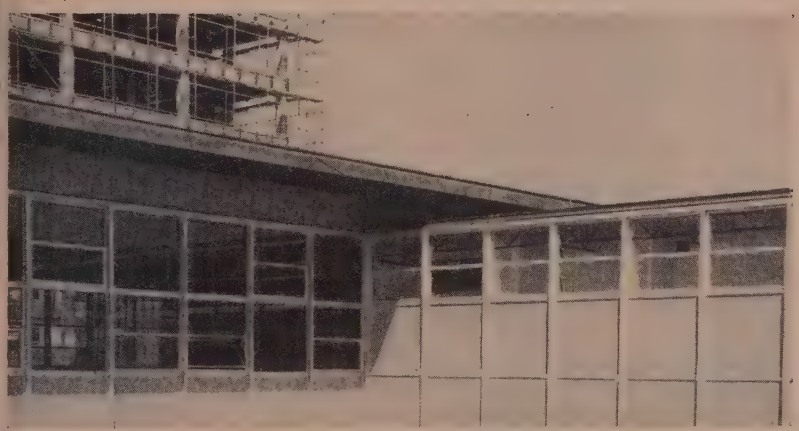

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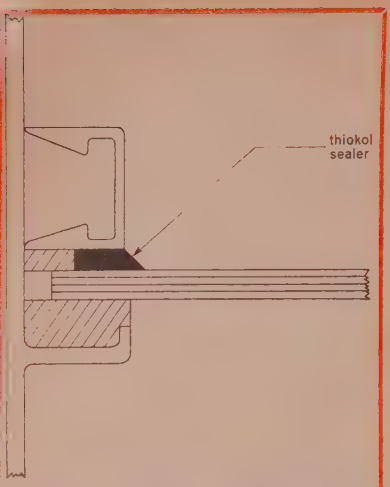


■ *Fig. 1. Typical use of Thiokol type of sealer in conjunction with less costly sealer in glazing joint.*

are potential trouble spots.

A common type of expansion joint is a mastic-loaded spigot working in a hollow aluminum bar. In curtain walls consisting of large pressings with cutouts for windows, expansion is taken up by flexing of the returned edges of the sheet metal panels. Most British systems have an expansion joint horizontally at every mullion and vertically at every floor. A few put vertical joints at every second or third floor — apparently without trouble.

It is also necessary to secure the infilling panels in such a way that they can float freely in relation to the grid as in general they will have a different coefficient of expansion from the light alloy grid bars.

A curtain wall might be defined as a multitude of bars and panels in a state of perpetual movement. The problem is to permit all this movement and at the same time keep the rain out. When one considers that in a severe storm each 10 ft. square of wall collects rain at the rate of 1 gallon per minute, an amount which accumulates down the facade, it is no great discredit to a curtain wall if, once or twice, it has not been 100% watertight.

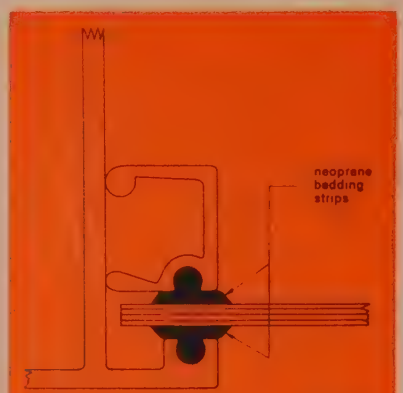
All systems use mastic. It is generally admitted that oil-based mastic will only remain elastic for a time. It will fail sooner or later, depending on conditions and design of the joints, after which it will have to be renewed.

In systems where mastic is the main line of defense, it is important that the joints be designed so as to extend the life of the mastic as long as possible, by (a) providing a liberal thickness of mastic so that the strain is reasonably low; (b) by shielding the mastic from the sun and from extreme exposure. Where failure of the mastic is anticipated within the life of the building, the design should be such that the wall can be re-sealed as easily as possible, perhaps 150 ft. above the street.

A promising development is the Thiokol type of sealer developed for aircraft fuel tanks and now available for curtain wall use. This is a two-part material which, after mixing on site, cures to a highly stable synthetic rubber with excellent adhesion. It is more durable; has superior mechanical properties; can undergo a stretch of 300% or more without failure or loss of adhesion. Adhesion is so positive that it is difficult to break down the joints — a disadvantage if a damaged panel has to be replaced.

Although Thiokol sealers have been used successfully for nearly 20 years in other fields, there has been no long term experience with them in curtain walls. But results obtained so far are promising.

Unfortunately, they are expensive and have a short pot-life after mixing. Special joint designs have a cheaper, less sticky material for the main filling, a relatively small amount of Thiokol being used for the seal (Fig. 1). The extra first cost, compared to conventional mastic, may be a shilling per square foot of wall. This does not seem an excessive figure to pay for freedom from trouble in years to come.



■ *Fig. 2. Typical use of extruded Neoprene gasket as sealer.*

There is not much escape from mastics in expansion joints in the grid, although in some systems the mastic is only the second line of defense. For sealing joints between infill panels or windows and the grid, however, an alternative is an extruded gasket such as Neoprene. The life of such a gasket is not unlimited, though probably longer than that of oil-based mastic. There is scope for ingenious design of such gaskets (Fig. 2) and of the aluminum sections which receive them.

In some systems the mastic forms the first line of defense; any water that gets by is then carried down the inside of the hollow mullions and — it is hoped — let out at the foot. In others, the patent glazing principle is used, the water being carried away in channels outside the sealed surface.

To Prevent Heat Loss . . .

Thermal insulation performance of a curtain wall is assessed by considering the infill panels, the windows and the structural grid. Heat loss through the panels is very little, because it is normal practice to use proprietary panels with a good U value — often as low as 0.2. The windows will tend to let considerably more heat through, but the provision of double glazing reduces the U-value from about 1.0 to 0.5.

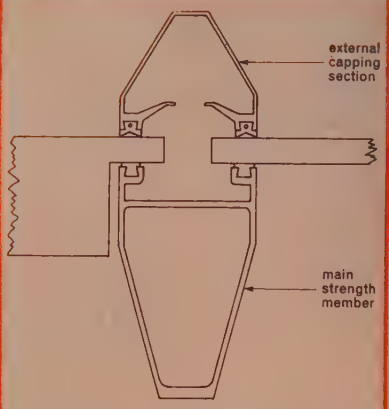
Heat loss through the grid bars can be of great importance, and tends to be overlooked. Some systems consist of an internal strength member and a separate external capping with no direct line of metal contact between them. The heat loss through the bars is slight, due to the thermal break (Fig. 3).

In others, the aluminum framing forms direct lines of contact between inner and outer surfaces. Although these may be only 0.1-inch wide, more heat can pass through them than is transmitted by the rest of the wall. Double glazing and efficient infill panels are thereby largely wasted. Heat loss by way of such "bridges" is worse when there are external metal panels in direct contact with the bars.

In climates colder than ours, the cold radiation effect may come into operation; the inside surface of bars passing right through the wall can get so cold in sub-zero weather as to make it unbearable to stand close to them.

And Control Condensation . . .

Condensation problems have to be considered in relation to the windows, the infill panels and the grid itself. With single glazing there are bound to



■ *Fig. 3. Extruded mullion with thermal break to prevent heat transfer. Direct metal-to-metal contact between external and internal elements is prevented by using nylon nuts and distance pieces.*

: some days when condensation forms
1 the windows. Many designs incorpo-
te a transom section with a channel
collect this condensation. In some,
ie moisture is led off through weep-
oles to the outside; in others, it is
ored in the channels until it evapo-
ates.

Infill panels need careful considera-
on. In most installations there is a
ack-up wall behind the panel. When
nternal humidity is not high, conden-
ation can be avoided by having a
rained cavity between the panel and
he back-up wall. When such a cavity
s inconvenient, a vapor barrier should
e provided behind the internal wall
ace.

Framing members without a thermal
reak can cause condensation trouble
n cold climates. In Canada, for example,
t has been known for mullions of this
ype to become coated with ice. This
an only be overcome by using mem-
ers which have exterior and interior
arts not in metallic contact with one
nother. Even intermittent contact by
way of bolts should be avoided by the
se of nylon washers and packs.

Surface Finish Important

When left exposed to the weather aluminum loses its bright appearance. In rural districts it may take a year or two; in a dirty city atmosphere it will probably take a few months.

There is no question of the members losing strength. The amount of metal consumed by natural weathering, even after 20 years, is only a fraction of 1%, and the tensile strength is barely affected.

Weathered aluminum looks like weathered Portland stone, and there is no logical reason why weathered aluminum should be thought more displeasing than stone.

If the aluminum should stay looking like aluminum, regular cleaning is essential. There are two courses. One is to erect mill finish aluminum and clean it three or four times a year; the other is to use anodized aluminum and thus reduce the frequency of cleaning.

But even using the modern heavy architectural anodizing with a .001 inch oxide film, some cleaning is still essential if the surface is to remain bright. An uncleaned anodized bar will eventually start to roughen, and, after many years, become indistinguishable from non-anodized material.

A curtain wall must be quick to erect, for this is one of its selling points. With nearly all British systems, the bars are erected one by one to form a structural grid, after which the panels and glazing are inserted. By paying careful attention to the fixing brackets (which have to take up dimensional errors in the main

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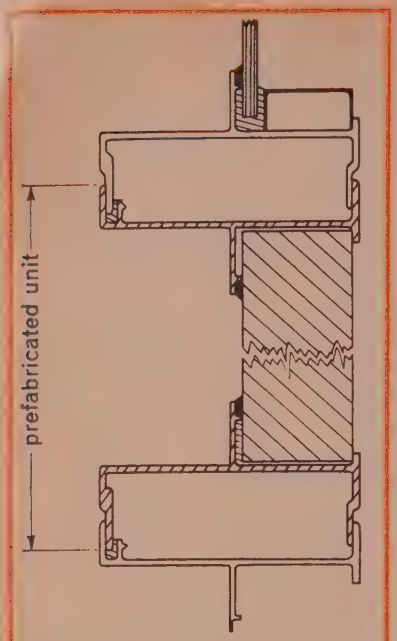


■ *Fig. 4. Example of prefabricated curtain wall construction using the split mullion principle.*

frame) and to the mullion/transom connections, these systems achieve a high erection rate.

Even faster erection is possible by prefabricating wall units in the factory (Fig. 4). Site work consists simply of bolting these units into position and applying the glass. Sealing of the joints is done in the factory under ideal conditions.

It is important to consider whether erection is to proceed from inside or outside the building. When scaffolding is used, it is convenient for the erectors to work from outside. On tall buildings, there may be no scaffolding, and systems which cannot be adapted to erection and infilling from within, such as those that glaze with an external capping section, are at a disadvantage.

The ideal arrangement is to be able to glaze from inside or outside. This is possible with some I-type mullions. The wall can then be built initially from inside, and any panels that might get damaged after the back-up wall is in position can be easily replaced from outside.

Design of Sections

In trying to meet the many requirements for a curtain wall, the designer has at his command the remarkable flexibility of the extrusion process.

Sections that are extremely thin in relation to their width can be produced. For example a thickness of only 0.08 inch for a section 9 inches wide is typical. The minimum thickness limitation is very seldom a factor in curtain wall design. Solid sections up to 18 inches wide are extruded in this country. For hollow sections the maximum width is somewhat less.

Certain types of section used to be regarded as unsuitable for extrusion, due to difficulty either in actual extrusion or in subsequent corrective operations. Aluminum curtain wall designers have consistently disregarded the extruders' difficulties and these sections are now in everyday production (Fig. 5).

Most curtain wall firms have so-called "standard" sections, but these sections seldom stay standard for long, as they are continually being modified and improved as the system is developed to a higher degree of perfection. The low tool charges associated with extrusion make this healthy state of affairs possible.

Many systems make extensive use of hollow sections, and although the die costs tend to be several times higher than for solids, they are still low enough to permit great flexibility. It is not uncommon for sections to be specially designed for one particular contract.

Formed Strip Sections

In some systems the main members are formed from sheet, instead of extruded. This has the advantage that sections of unlimited size are possible, irrespective of thickness. Really bold mullions and transoms can thus be economically produced in light gauge metal (.128 in. or .104 in.), giving a more striking vertical or horizontal accentuation to the grid than is feasible with extrusions.

There are some design limitations when formed strip sections are used. The metal has to be the same thickness all over, and it is impossible to incorporate nibs, grooves, beads, drilling scours and other devices that would be easy by extrusion. Sharp corners are impossible. Hollow shapes can only be produced by joining open sections together.

Finally, there is a length limitation imposed by the size of available folding equipment, 14 or 16 ft. being the usual maximum. This rules out mullions that are continuous over two stories.

To save metal, the designer tries to cut the weight of each section to the minimum consistent with functional and structural requirements.

There are two ways in which the shape affects the price. First, hollow extrusions cost about a quarter as much again as solids. Secondly, thin straggly sections cost up to 10% more than compact ones, weight for weight. Hollow extrusions, which are the instinctive choice for the main members of a curtain wall grid, carry a distinct cost penalty when compared with even the most straggly solid sections. Hence, the practice of making a box-section by joining a pair of open extrusions.

This is possibly unrealistic. The present price-structure for extrusions was evolved over ten years ago when sections beyond a certain degree of slenderness were not envisaged. Since then, more and more difficult sections have been developed, many of them needing to be laboriously roller-corrected after heat treatment.

As a result, many solid sections, although quicker in actual extrusion than typical curtain wall hollows, cost just as much to produce. Curtain wall kits comprising such sections — which are still priced far below hollows — would seem to be enjoying an artificial advantage over kits which use extruded box section members.

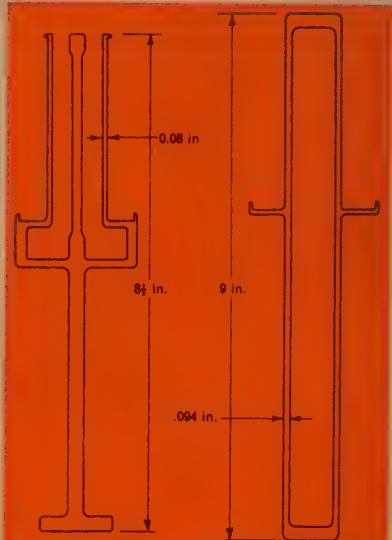
Structural Considerations

The form of the main structure has an important bearing on the design of the curtain wall. In some buildings, the floor slab comes out in front of the columns and presents a series of horizontal faces over which the curtain wall must span. In others, edge beams and columns form a grid over which the finer grid of the curtain wall has to be superimposed. In less common arrangements the floor slabs or the columns, or both, protrude through the sheath.

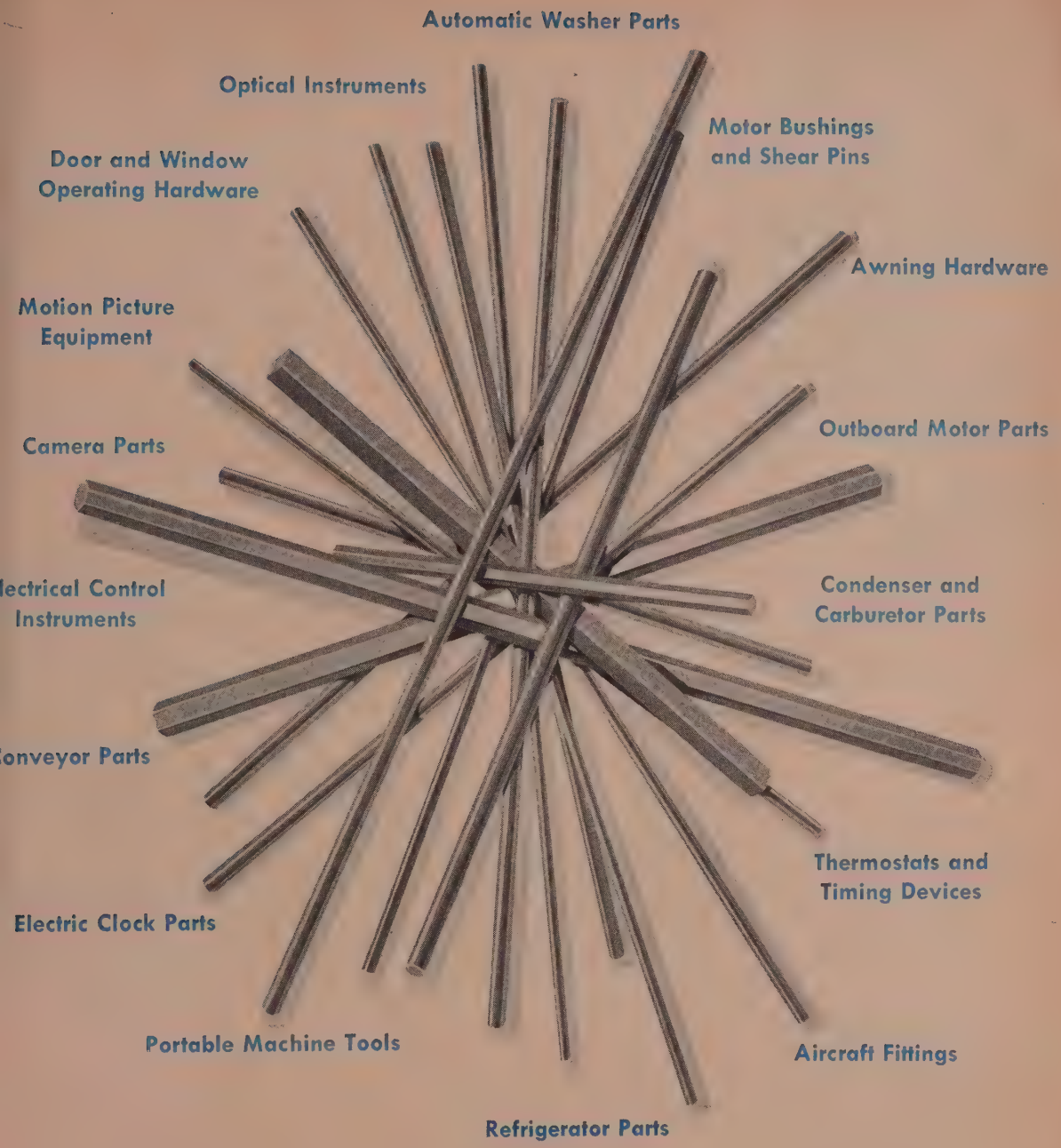
Various structural configurations of curtain walling may be classified under four main headings:

Spanning Mullions: In this, the most common arrangement, the main members and vertical mullions span from floor slab to floor slab. The transoms act as secondary horizontal beams between the mullions (Fig. 6—top).

Spanning Transoms: Where the col-



■ *Fig. 5. Two "difficult" curtain wall extrusions, considered impossible in Britain ten years ago.*



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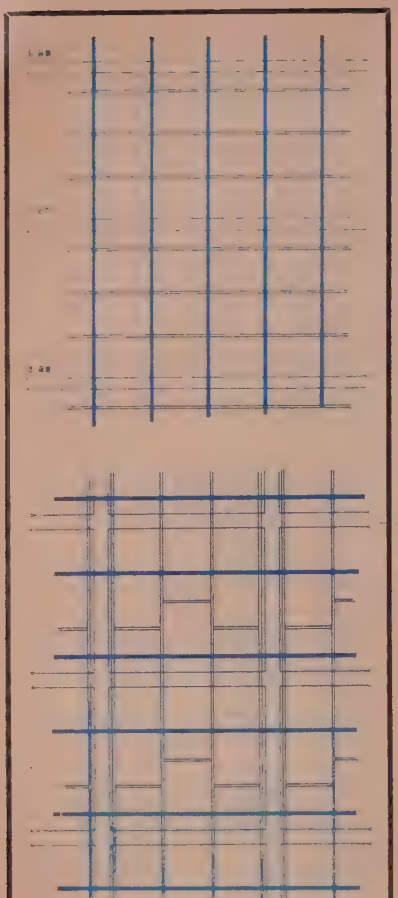


■ *Fig. 6. Comparison between two curtain wall grid designs. In spanning mullion grid (top), mullions are main members, spanning from floor to floor while transoms are secondary members fitting between them. In spanning transom grid (bottom), transoms are main members, spanning between columns.*

umns in the main frame come flush with the edge of the slab and are not too widely spaced, it may be convenient to make the transoms the main members – spanning from column to column – and the mullions, the secondary members (Fig. 6—bottom).

If the columns are farther apart, this arrangement is still possible by using sub-stanchions within the back-up wall to cut down the span of the transoms.

Panel Construction: This is the type of curtain-wall formed of large pressings with cut-outs for the windows. These prefabricated wall units normally span from floor to floor.

Cantilever Walls: With this arrangement, the main structural members extend vertically from the head of the window on one floor to the sill on the floor above. They are rigidly attached to the slab or face-beam, and cantilever out, upwards and downwards. Over their ends pass header and sill extrusions which carry the windows (Fig. 7).

Vertical elements can be either separate bars carrying infill panels, or continuous cantilevering spandrels in the form of castings or interlocking vertical extrusions.

Window Sections

With so much thought being put into the ingenious design of curtain walls more attention might be given to opening lights as an integral part of the structure – not merely as a standard item to be inserted after the main grid has been completed. Some advanced designs of sliding and sash windows have appeared, but casement and pivoted windows seem archaic compared with the elegant design of the wall.

The opening frame members need to be thick so as to make them stiff in torsion, and there is probably little room for improvement of the conventional sections used. But the fixed frame, which becomes an integral part of the grid, has no particular function to perform. The heavy sections invariably used seem out of place beside the other carefully designed sections.

It might be that duplication could be avoided by designing the fixed frames integral with the grid extrusions.

Composite Construction

It often happens on a high building that the floor-height is increased to perhaps 15 or 20 feet on the lower one or two stories. In order to preserve the same unbroken line of the mullions down the face of the building one may increase the depth of the mullion inside the building on these floors, or reinforce the standard mullion with galvanized steel flat, inside the section and insulated from the aluminum. The latter is a logical composite construction.

Less logical is the use of steel reinforcement all the time. On a typical floor-height of 11 feet it is possible to meet the structural requirements with an all-aluminum mullion, perhaps 4 inches deep. Therefore it is difficult to see why some systems have standardized on a steel flat for the structural member, carrying a separate unstressed aluminum extrusion for the glazing, the latter weighing half as much as an all-aluminum mullion. The disadvantages of using steel are endured for a negligible gain in cost and depth (Fig. 8).

For members subjected to bending, the two requirements that must be satisfied are strength and stiffness. Strength implies adequate safety against catastrophic collapse due to failure of the metal. Stiffness means reasonable resistance to elastic deflection under load.

With most materials, strength is the main consideration for bending and stiffness are seldom critical. In aluminum beams, on the other hand, owing to the greater flexibility of the metal (three times that of steel) stiffness rather than strength is usually the criterion in curtain walls.

No requirements for strength or stiffness have been laid down in this country for curtain wall members. It is generally felt that a factor of safety of 2:1 on proof stress is satisfactory. This is fairly well in line with current practice on steel building structures in which the working stress in tension (9 tons/in.^{2}) is slightly more than half the yield stress, and the load factor on buckling of compression elements is 2:1.

The normal curtain wall extrusion alloy, H9-WP (6063-T6), has the following guaranteed mechanical properties:

0.1% proof stress ..... 10 tons/in.^{2}

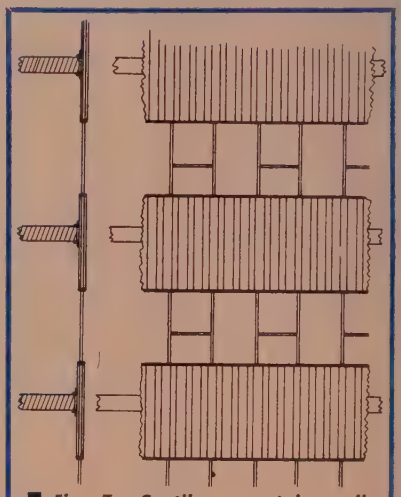
Ultimate strength ..... 12 tons/in.^{2}

Taking a safety factor of 2.0 on proof, a reasonable allowable stress under design loading is thus 5.0 tons/in.^{2}.

Some may argue that this is unduly conservative. In steel design it is customary to regard stresses due to wind as less dangerous than those due to other forms of loading, a 25% increase in allowable stress being permitted when dealing with wind. The same argument might be applied to curtain wall design which is entirely concerned with wind loading.

However, curtain wall units are relatively light, and are likely to feel the full effect of a high-intensity gust which a larger, heavier structure would not feel. Bearing this in mind, a 5 tons/in.^{2} working stress is probably sound. A higher value would seldom lead to economy because of the stiffness requirement.

Curtain wall members that are folded from sheet, instead of extruded, are usually of NS4 (5052) alloy, in the



■ *Fig. 7. Cantilever curtain wall. The main members, in the form of interlocking extrusions or castings, cantilever out vertically, above and below the floor level.*

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¼-H or ½-H temper. This is slightly stronger than H9-WP, so it is safe to work up to 5 tons/in.^{2}.

Stiffness rather than strength still tends to be the criterion of section design, but with this important limitation: If the section incorporates flat elements that are very wide in relation to their thickness, there is a danger of premature failure due to local buckling.

For NS4-½H, this possibility can be ignored as long as the ratio of flat unstiffened width (b) to thickness (t) is nowhere greater than 40:1. For any part of the section in which this b/t value is exceeded, the allowable compression stress must be reduced according to the formula:

$$\text{Safe stress (tons/in.}^2) = \frac{8000}{(b/t)^2}$$

This incorporates a safety factor of 2:1 against failure by buckling, and applies to flat elements carrying a uniform compression stress. For elements such as webs in which the longitudinal stress varies, a somewhat higher value than that given by the formula may be taken for the *maximum* safe compression stress.

There is also the strength of the connections to be considered. The brackets holding the curtain wall to the main frame must be more than adequate to resist the specified pressures and suctions, as well as taking the dead weight of the wall.

Stiffness

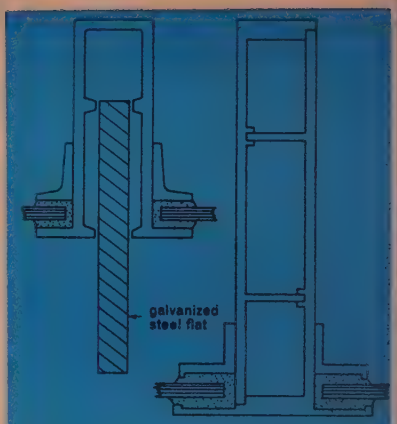
Three factors determine the required stiffness of curtain wall members: They must not be flexible enough to cause damage to the panels they are supporting; they must look stiff and feel stiff.

The first is not likely to be critical. It is well known that on an 11 ft. simply supported span, a deflection of at least 1¼ in. (or span/90) is necessary to break ¼ in. wired glass. This is more than double the acceptable deflection in curtain wall design under full wind pressure.

The look and feel of the structure are thus the predominant factors. The "look" requirement is met if the momentary deflection when a gust of wind hits the building is imperceptible to the occupants. The "feel" will be satisfactory if the structure does not deflect too much when leaned against.

The acceptable deflection under wind, from visual considerations, is a function of the span. Current aluminum curtain wall practice in this country allows a figure of span/250, although span/200 is sometimes used.

Members designed to span/250 deflection under design wind pressures are usually found to feel satisfactory.



■ *Fig. 8. Comparison between steel-reinforced mullion (left) and all-aluminum mullion of roughly equal structural performance.*

Summary

In the early days of curtain walling many technical problems were not fully appreciated, sometimes with dire results. Much experience has been gained since then, and an architect now specifying an aluminum framed curtain wall may be confident of getting a successful job. The next development will probably be a greater use of prefabrication.

It would be impossible to conclude without some mention of the aesthetic side. A disappointing feature of curtain walling in this country is that all the designs so far produced have the same characteristic texture. As a contrast to traditional construction, they are supremely refreshing at first. But after a while, particularly when there are several in one vicinity, they become monotonous.

The fault lies in the fact that all the designs use the same grid-and-infill approach. No attempt seems to have been made to explore other solutions, thus leaving architects with a limited range of curtain wall treatments.

The use of very large folded strip sections for some members instead of extrusions is a promising development that makes a more definite vertical or horizontal accentuation possible. But this is still grid-and-infill construction. We need entirely new systems which will be a contrast to what might by now be described as traditional curtain walling.

Panel construction is one solution which we have yet to see. Another is horizontal accentuation by means of continuous spandrels, achieved either by bringing the infill material out in front of a traditional grid, or else by applying the cantilever principle.

In its first ten years, the curtain wall industry has solved the technical problems. Its target for the next ten years should be to provide more solutions to the aesthetic problem.

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.02% Yield Strength, psi	135,000	110,000
Elongation (% in 2")	15	18
Reduction in Area, %	18	20

STRESS RUPTURE:	Combination Smooth and Notch Bar	Smooth
Temperature, ° F	1350	165
Stress, psi	85,000	25,00
Life, Hours	100	50
Elongation, %	12	12
Reduction in Area, %	14	14

Guaranteed Minimum Mechanical Properties

TENSILE PROPERTIES:	Room Temp.	1400° F
Ultimate Strength, psi	180,000	135,000
.2% Yield Strength, psi	132,000	115,000
.02% Yield Strength, psi	120,000	100,000
Elongation (% in 2")	12	13
Reduction in Area, %	14	18

STRESS RUPTURE:	Combination Smooth and Notch Bar	Smooth
Temperature, ° F	1350	165
Stress, psi	85,000	25,00
Life, Hours	40	25
Elongation, %	8	10
Reduction in Area, %	10	12

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After installation, there is the danger of long-term surface staining and dulling caused by atmospheric fumes and weathering. A recently developed surface coating for aluminum largely solved these problems during the erection of two widely separated Pacific Coast buildings.

One of the buildings, the new $40 million Convair plant for the manufacture of Atlas missiles in San Diego, has been in use for only a few months; the other, the American Fore Loyalty Group Insurance building in San Francisco, was completed and occupied about one year ago.

The surface of the aluminum wall sections for both of these projects was protected immediately following fabrication with a clear half-second butyrate lacquer coating. The lacquer was developed specifically for aluminum surfaces by W. P. Fuller & Co., San Francisco, to provide protection against the extreme weathering effects of western climate as well as against staining, abrasion and plaster damage during construction.

These two projects are believed to represent the largest commercial and industrial constructions in America to have a protective coating of half-second butyrate lacquer applied to the aluminum wall sections before erection.

Metalco, Inc., Emeryville, Calif., supplied the aluminum sections for both of these projects. Metalco was principally concerned with protecting the sections against plaster damage during construction. The success of its tests and the experience since gained in the field has led to Metalco's adopting the lacquer as a standard coating for all aluminum requiring a protective finish.

Anodized; Then Lacquered

Aluminum sections for the Convair and American Fore projects were first anodized and then lacquered in order to provide maximum protection. Applied in Metalco's plant, the lacquer was sprayed onto the aluminum surfaces with conventional equipment.

The sections were ready for further handling after about five minutes of air drying. The rapid drying characteristic of butyrate lacquer is an important advantage since Metalco has recently altered its plant operation to a conveyor system.

In its original development work with the butyrate lacquer, now marketed as Clear Aluminum Coating 167-C-189, Fuller conducted comparative tests with a number of experimental clear coatings including silicones, alkyds, and acrylic formulations, several commercial coatings, and its present half-second butyrate lacquer.

The butyrate formulation showed the greatest abrasion resistance before and after weatherometer tests, no discoloration in the fadeometer, and highest comparative resistance to salt spray, lime and mortar. Other Fuller tests revealed that the butyrate coating exhibited the best adhesion to various types of aluminum and has superior resistance to immersion in water without loss of adhesion.

Half-second butyrate, the basic film-forming ingredient in the Fuller coating, is supplied by Eastman Chemical Products, Inc., Kingsport, Tenn., subsidiary of Eastman Kodak Co., who originally developed it as a tough, non-yellowing film-former for protective metal finishes.

During construction, the aluminum sections were erected in the normal manner without any special handling. Except in areas of extreme contamination, rainfall will be sufficient to wash off any accumulation of dirt or grime on the lacquer surface, thereby maintaining its cleanliness to a substantial degree.

This is a particular advantage in the case of tall structures such as the American Fore Insurance building. It is expected that the coating will continue to provide protection to the aluminum surfaces of these buildings for three to five years at which time they can be recoated with the lacquer following a simple solvent cleaning.

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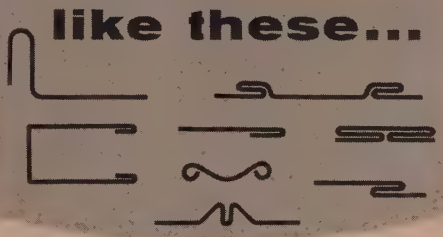

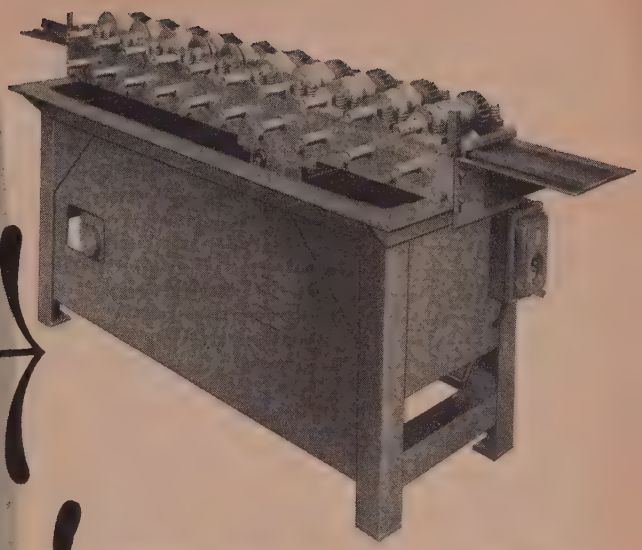

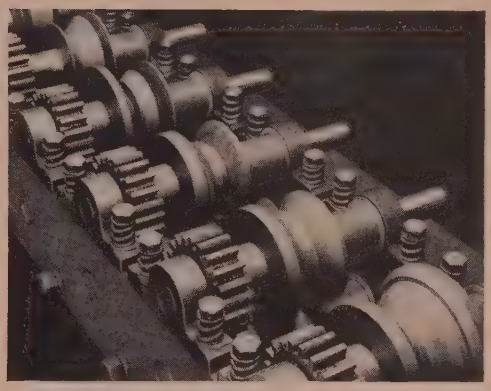

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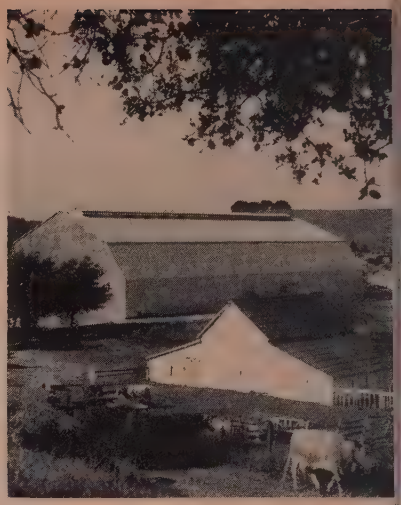
aluminum's biggest market for sheet

ROOFING AND SIDING

In the residential field, home improvement and remodeling projects are still the major outlet, but financing institutions hit "shady" selling methods of some dealers. Use in new homes is rising sharply, spurred by National Homes' massive adoption of aluminum. Commercial and industrial building markets show greater promise for aluminum-Fiberglas sandwich panels. Farm building might lag next year.



■ *Huge farm building is roofed and sided with Kaiser Aluminum's V-crimp roofing and siding sheet. Farm building rose substantially this year, might drop off appreciably in 1960.*

SALES of aluminum siding and roofing continue to chalk up satisfactory gains despite the ups and downs of the nation's economy, which rarely deals harshly with all segments of the enormous building industry at the same time.

Industrial building declined in 1958 and '59, but is poised for an upturn next year — just when residential construction is expected to suffer a relapse after this year's healthy recovery in housing starts. Although 1959 has not produced much to cheer about in construction of commercial, institutional, recreational and religious buildings, better performance is anticipated in 1960.

Even if residential construction lags next year, consumption of aluminum siding and roofing for homes should hit a new high. For one thing, the bulk of this material has traditionally been applied to existing homes — a market that is not seriously affected by the vicissitudes of new home building.

What's more, use of these products in new homes is slated to soar to new highs next year, due to such developments as National Homes' adoption of aluminum as the standard exterior cladding material for its prefabricated homes (see story on page 32), and the burgeoning success of the primary aluminum producers' high powered promotional programs.

Siding for all types of construction represents the aluminum industry's largest single sheet application. Some 85 million pounds of aluminum residential siding were used in 1958, according to John R. Quinn, Reynolds Metals' director of architectural and construction markets. Quinn estimates that the total this year could jump nearly 32% to 112 million pounds.

There are more than 30 makers of aluminum residential siding in the U. S., and better than 90% of this industry's output goes into home improvement and remodeling projects.

Industrial roofing and siding are another good growth market for aluminum. Reynolds estimates that use of aluminum in industrial jobs will rise from about 27 million pounds in 1958 to around 32 million this year.

Kaiser Aluminum's figures are generally higher. Consumption of aluminum industrial siding totaled about 40 million pounds in '58, according to Kaiser, and the figure should rise to around 50 million pounds in '59.

"We expect consumption of aluminum *residential* siding to increase to at least 195 million pounds annually by 1963," declared William J. Slemp, Kaiser Aluminum's manager of residential business developments.

Tight money will be the cause of a dull home building year in 1960. Issuance of the U. S. Government 5% bonds last July touched off a run on thrift institutions. Even the high interest-paying savings and loan associations saw their cash assets shrink as savers converted their money into the high interest bonds.

The steel strike is also partly to blame. It reduced or stopped the income of wage-earners both in and outside the steel industry, forcing them to dip into their savings for subsistence. Some banks say that a wave of consumer buying has also cut into their reserves of funds available for mortgages.

Despite these pressures on mortgage

■ *Split level in style, but ranch-type in appearance because of its ground-hugging lines, this "House of Ease" model is part of a new development in Bloomfield, Conn. The home's maintenance-free features include shingles, siding, flashing, cornice, soffits, windows, louvres, doors, hardware, gutters and downspouts — all made of aluminum.*

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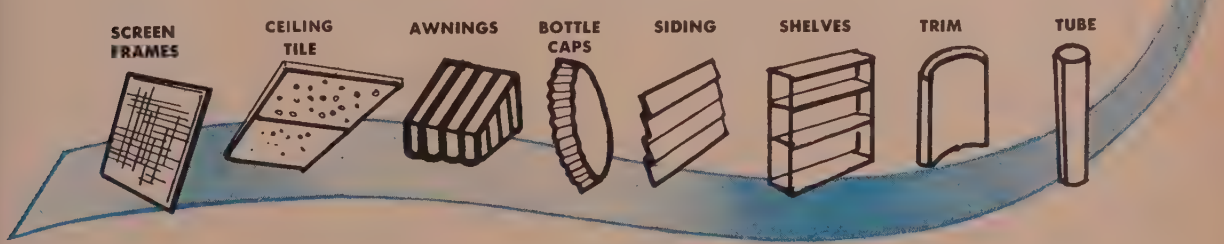

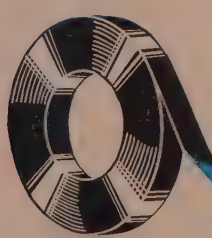

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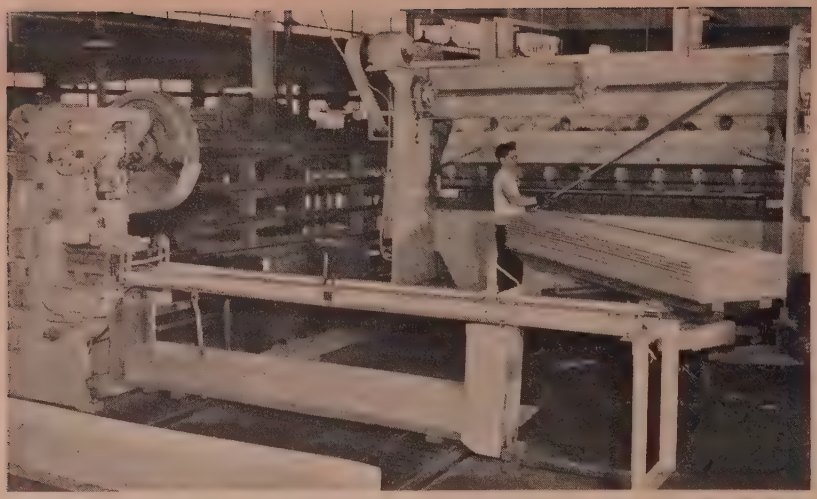


■ *Big manufacturer of aluminum siding and shingles is Life-Guard Industries, Inc., Cincinnati. All siding products are made in a range of thicknesses from .019 to .025-inch. Life-Guard cuts siding blanks from coil stock (out of picture) then flattens each blank in a continuous cutting, flattening operation. Blanks are then brake-formed, after which they are spray-painted.*

lending volume, aluminum residential siding has been winning increased acceptance because of its aesthetic and functional qualities. Spot checks of home financing agencies in the Chicago area testify to this heightened popularity.

"In remodeling contracts that we are getting," said one bank executive, "we notice that aluminum siding is specified at least as often as other types of materiial for installation on frame buildings. I wouldn't say there has been a flood of requests for aluminum siding, but often enough, it's specified.

"Of course, there are many other types of remodeling and home improvement jobs," he added. "For every 10 contracts, perhaps two or three are for a new siding job."

Another bank official rapped the selling tactics of some aluminum siding dealers.

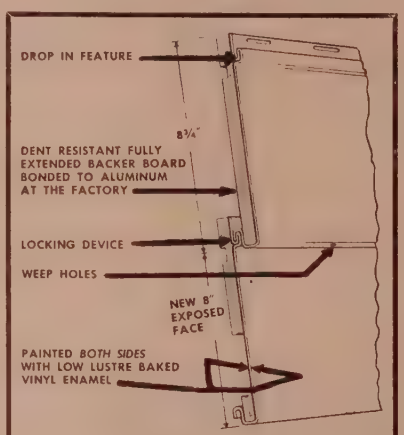
"Aluminum siding has had trouble getting off the ground as a home improvement material because of the crooked selling practices of some distributors," he asserted. "In the past year, however, we've noticed that more and more legitimate contractors have started to use it. Their trouble, I might say, is finding good applicators.

"The addition of color to aluminum siding has certainly increased its popularity," he conceded. "I've also noticed its increasing use in new homes, particularly where it is teamed up with wood or brick for contrast."

But this man's company still views an aluminum siding job with suspicion unless they know the source of the material to be reliable.

An executive of still another institution stated flatly that he discouraged the use of aluminum siding in home improvement jobs because so many sellers of the product have duped the homeowner in order to make a sale.

"We consider the aluminum siding manufacturers responsible for this condition," he declared. "They should be a little more particular about the type of distributor they solicit."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WEEP HOLES
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PAINTED BOTH SIDES WITH LOW LUSTRE BAKED VINYL ENAMEL

■ *Improvements on traditional flat wood clapboard siding are exemplified by aluminum product of The Security Companies, Detroit. Company also makes V-groove paneling.*

It should be noted, however, that some banks and savings and loan institutions are equally responsible. For years they closed their eyes to bait advertising and other shady practices and collected their money. Perhaps the financing institution is in the best position to fight these dishonest practices.

"I think we are on the verge of a sort of breakthrough in the use of aluminum siding," a veteran home appraiser said. "I notice more and more requests for the stuff, and it's a great influence in raising the value of the house."

This authority remembers the early use of aluminum siding right after World War II, and has observed the improvements it has had since then.

"But it must still be applied properly," he said. "An inexperienced or careless applicator can make some of these jobs look terrible."

The appraiser's savings and loan association intends to become very active in Reynolds Metals' "House of Ease" program "as soon as mortgage money becomes more plentiful."

This program has done much to spur the increased use of aluminum residential siding. It was accelerated this year having as its goal the creation of "House of Ease" subdivisions in the 160 cities which account for 80% of the nation's new home construction.

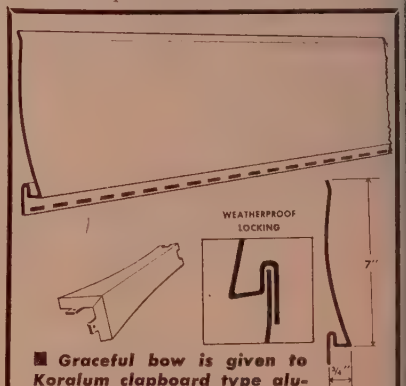
By the height of the fall building season, Reynolds expected to have penetrated nearly 75 key cities in subdivisions representing a potential of 15,000 homes. Developments such as these will have a strong promotional effect among architects, contractors, and homeowners.

Lumber Dealers Sign Up

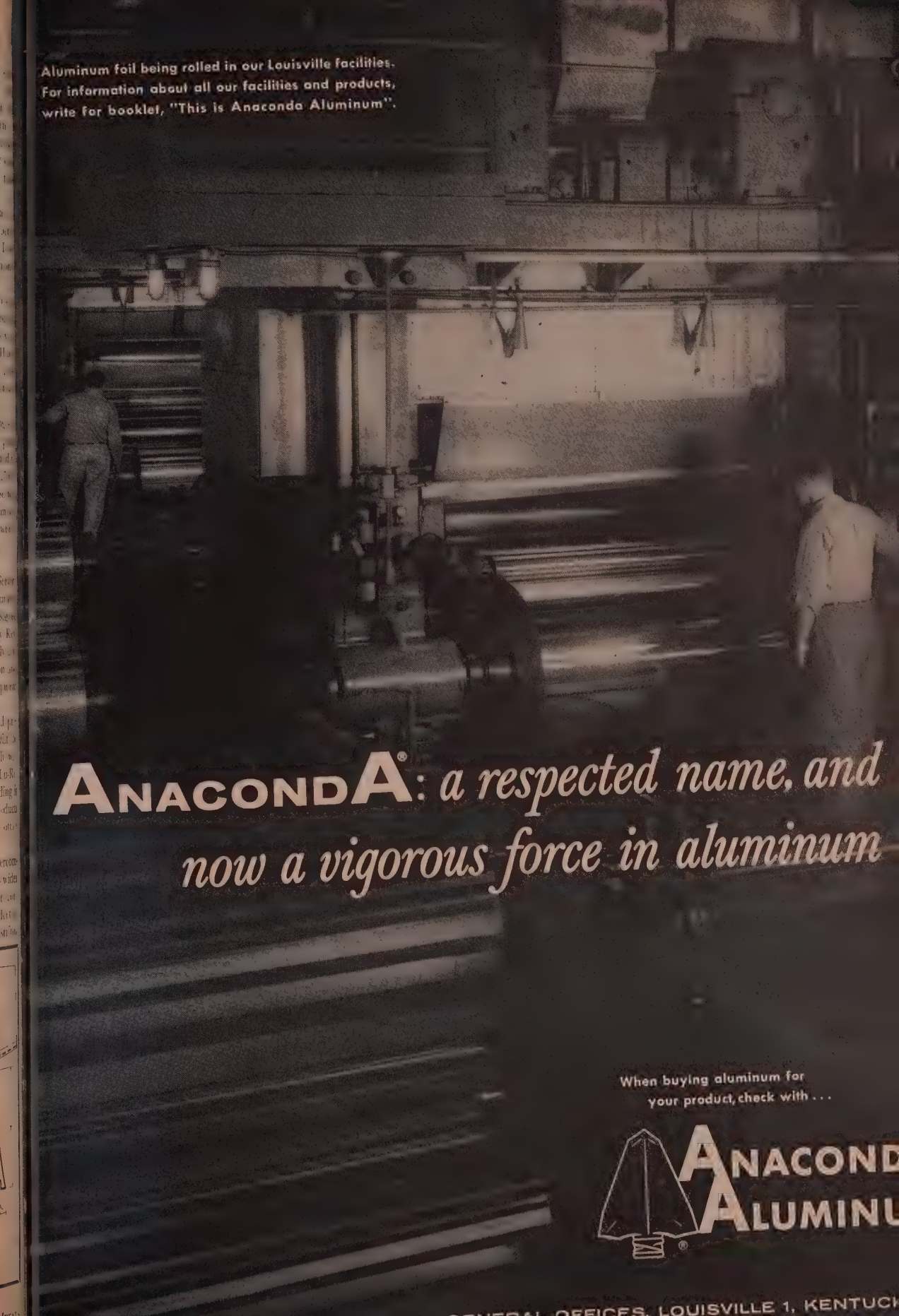
Earlier this year the Lu-Re-Co Service Association, a large group of lumber dealers in the U. S. and Canada, signed a contract with Reynolds whereby Reynolds and its customers will supply aluminum products to the Association and cooperate in the research, development and promotion of new products.

Sales, marketing, advertising and promotion of aluminum products will be handled by the Association which will sell them to the more than 1400 Lu-Re-Co lumber dealers. Residential siding is included in the aluminum products line, along with shingles and many other home building products.

"This is a giant step toward overcoming one of the biggest obstacles to wider usage of aluminum in new home construction — the need for more effective and widespread channels of distribu-



■ *Graceful bow is given to Koralum clapboard type aluminum siding made by Lyf-Alum, Inc., Oconomowoc, Wis. Reinforced matching profile corners lock over the panels.*



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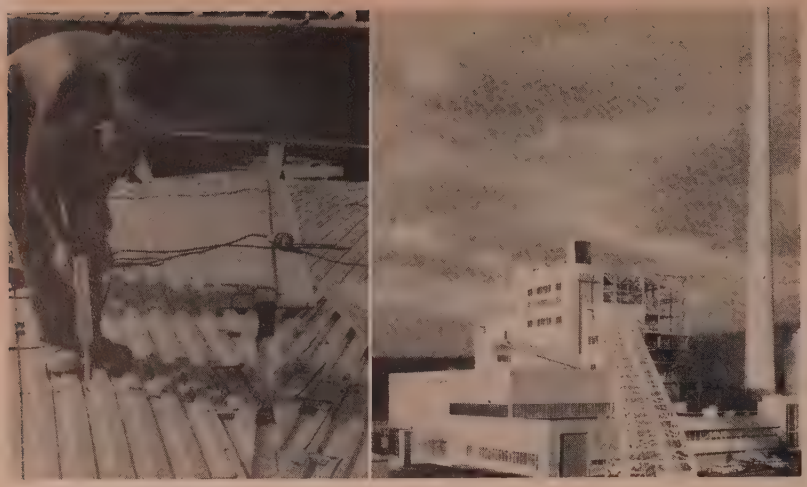


■ *Fastening down ribbed aluminum roofing to dome of the new, $6 million Las Vegas Convention Center. Reynolds 4-inch ribbed, stucco embossed, 3004 alloy, .040-inch thick aluminum was used. Clean-appearing, maintenance free aluminum will reduce air conditioning requirements because it reflects 95% of the sun's radiant heat. Metropolitan Edison Co. power plant (right), Allentown, Pa., is sheathed with commercial ribbed siding for low maintenance, attractive appearance.*

tion," said David P. Reynolds, executive vice president of the company.

An important part of the Lu-Re-Co arrangement is a training program that will turn selected dealer personnel into expert applicators of aluminum siding.

In 1958 Reynolds further entrenched itself in the aluminum building products field when it became sole distributor of the Lifetime aluminum shingle, a patented product of International Aluminum Co., Baton Rouge, La.

This 10 x 30-inch shingle is produced from striated aluminum sheet by high speed machines designed and patented by International Aluminum. It is considered one of the most effective residential roofing products because only one nail per shingle is needed and each shingle interlocks with its neighbors on all four sides. Application time is cut to 20 minutes per square (100 square feet).

The shingles form an exceedingly light, strong roof system which defies the strongest winds. During wind tunnel tests which simulated hurricane conditions (velocities up to 144 mph) the shingles held fast. The South Florida Building Codes have approved the Lifetime shingle.

National Homes Big User

Another important gain for the Lifetime shingle and for Reynolds has been unqualified acceptance of the product by National Homes, biggest manufacturer of prefabs; National Homes is buying the shingles in large quantities.

Meanwhile, Kaiser has taken steps to gain closer identification with the home building field by stepping up its engineering assistance to its customers and stimulating broader distribution of these products. One model home featuring 21 products of Kaiser customers has been built and more are under construction.

Kaiser also supplies semi-finished sidewall panels to National Homes. The simulated batten board siding is stucco embossed, and is given either three or four vertical ribs which measure about 1½ inches wide at the peak and slope to about 2⅜ inches at the base. Whether 3-rib or 4-rib, exposed width of the panels is about 49 inches. Sheet thickness is around .024-inch.

After brake forming, the panels are cut in lengths varying between 228 and 96½ inches and are then given a paint base for final finishing by National Homes. Kaiser also supplies raw sheet to Alside Division of Alsco, Inc., Akron, Ohio, who is making clapboard siding for National Homes.

There are powerful arguments in favor of aluminum as roofing and siding. Its heat reflecting properties make it highly practical for this application—cooler home interiors in the summer; reduced air conditioning costs; and lower heating costs in the winter. At the same time, aluminum's natural resistance to corrosion combined with enduring finishes eliminate periodic painting, the bane of the homeowner who has wood siding.

In this regard, an important feature of quality aluminum siding is the prepaint treatment in which coiled aluminum is cleaned, then given a conversion coating of the chromate or phosphate type. Such a coating not only enhances corrosion resistance, but also assures enduring paint adhesion — an advantage for the homeowner and the fabricator who has to form the siding and cut it.

While aluminum siding may become dented on impact, quality products made with the proper alloy and of a proper thickness will stand up as well as or better than wood, particularly when given extra rigidity by a backing of foamed plastic or other insulating material.

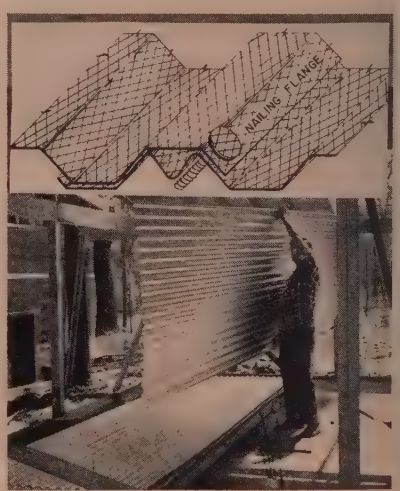
Aluminum residential siding started out by simulating the traditional wood clapboard design which most homeowners still prefer. But there have been limited variations of the standard, flat clapboard.

A noteworthy change was made by Lyf-Alum, Inc., Oconomowoc, Wis., in its Koralum siding. Here, the sections are given a graceful, concave sweep in a 6⅞-inch exposure. Profile corners preserve this interesting contour. The company makes a conventional flat siding (8-inch exposure) with the option of fiberboard backing.

A recent variation of this graceful contour is the French Regency siding designed and made by Alcoa for National Homes (see page 32).

Architects can achieve greater design latitude with aluminum siding that simulates board and batten construction — another traditional wood siding, having vertical lines.

Most recent development in vertical aluminum residential siding is V-groove paneling (it can be applied horizontally too) which also has limited use for interiors. The exposed face of this siding is generally 8 inches, with a bevel at each side which forms a V-groove when



■ *Diamond-Rib aluminum roofing and siding is made by Kaiser in extra wide sheets (50⅓ inches over-all). Sheets give full 48-inch coverage after lapping. In sketch at top note side fastening method and crimped channel which traps and drains off moisture before it can "siphon" between overlaps into a building. Kaiser also makes Green Diamond-Rib, used either for decorative uses, or as a prepaint treated material.*

The Lifetime aluminum shingle, distrib- ed solely by Reynolds Metals Co., is monstrated at a trade show by Frank Partalis, divisional manager for the mpany's architectural and building oducts sales. National Homes Inc., fayette, Ind., is a volume user of the e-nail fastening, 4-way locking shingle hich is produced in six baked enamel lors.

terlocked with adjoining panels. Hast- gs Aluminum Products, Hastings, ich., National Aluminum Products, nd The Security Companies, Detroit, re among the manufacturers of this pe of siding. These firms also produce uminum clapboard siding.

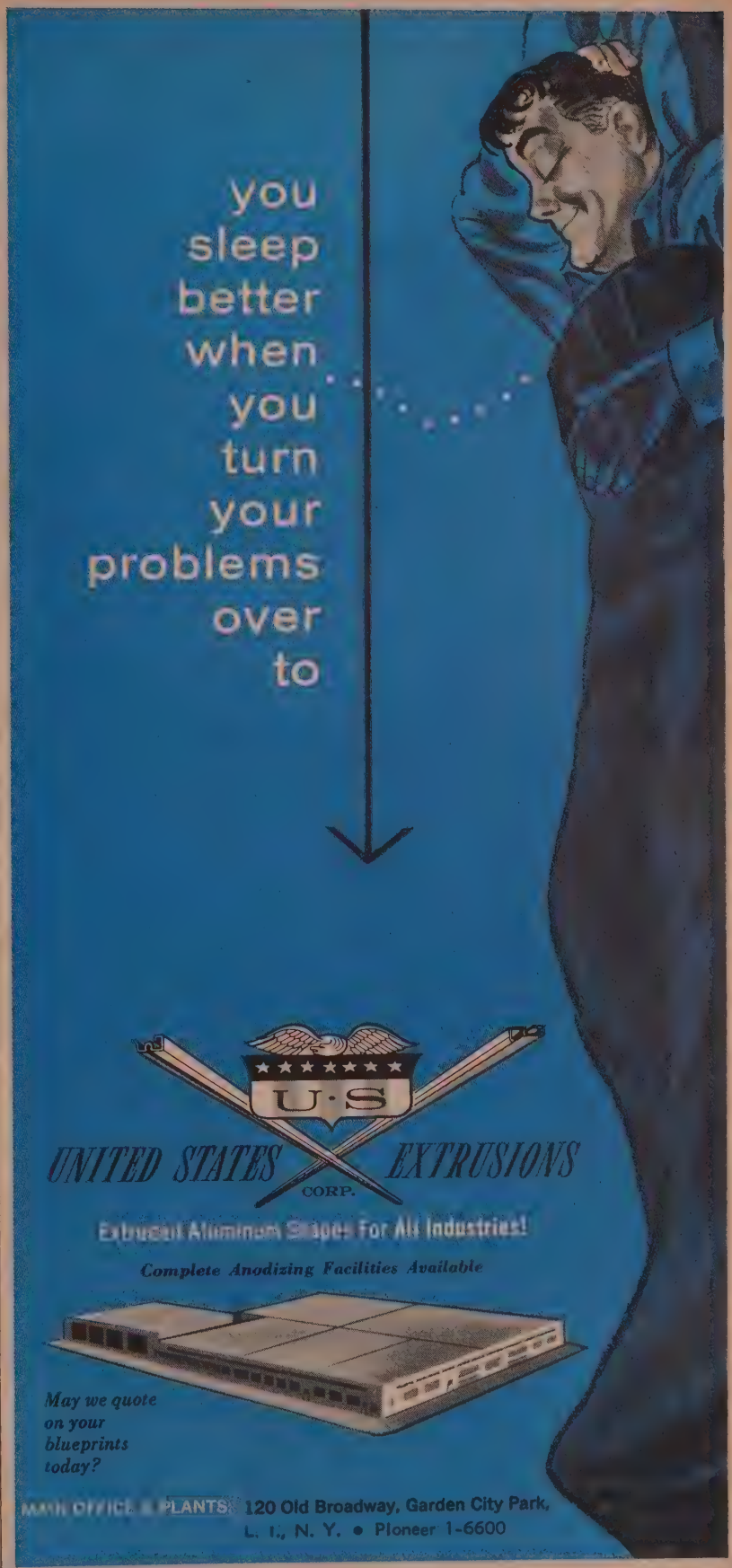
Globe Siding Products Co., Whiting, nd., entered the field this year with hermalume striated aluminum backed p with ½-inch thick insulating board. hese self-aligning panels, supplied in astel colors, are of a length suitable or one-man application.

Alcoa, Kaiser, and Reynolds are the olume producers of aluminum roofing nd siding for industrial, commercial nd farm use. Brauer Engineering, In- leside, Texas, Nichols Wire & Alumi- um, Davenport, Iowa, and Quaker tate Metals, Lancaster, Pa., are also eading manufacturers of aluminum oofing and siding.

R. C. Mahon Co. and Walcon Corp., oth of Detroit; the E. G. Smith Co., Pittsburgh, the George D. Widman Co., Los Angeles, and a few other manufac- turers buy embossed coiled aluminum to produce special narrow width, end roll formed panels which, because they have hidden fasteners, are especially suited for store fronts, shopping centers and small commercial buildings.

The three leading aluminum produc- ers supply various types of industrial roofing and siding having roughly the same configurations and the same range of thicknesses from .024 to .050-inch. The three configurations are V-beam, rib and corrugated, produced in mill

(*Continued on page* 82)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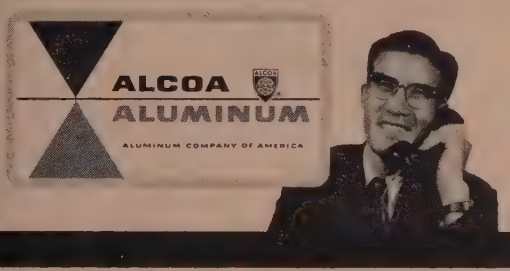

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NEW HAMPSHIRE
Nashua
Edgcomb Steel of New England, Inc.
TUxedo 3-7731

NEW JERSEY
Elizabeth
Adam Metal Supply of New Jersey
FLanders 1-2550
Harrison
Whitehead Metals, Inc., HUmbolt 5-5900
Hillside
Miller Steel Co., Inc., WAverly 6-6000
Kenilworth
Jones & Laughlin Steel Corp.
MUrdock 6-6900

NEW YORK
Albany
Eastern Metals Warehouse, Inc., 89-3281
Buffalo
Brace-Mueller-Huntley, Inc.
VIctoria 8700
Whitehead Metals, Inc., BEdford 3100
New York
(Brooklyn) Strahs Aluminum Company, Inc., BRowning 2-7000
(L. I. City) Adam Metal Supply, Inc.
STilwell 6-7737
Henry B. Lust Inc., (circles)
CIrcle 6-1748
Manhattan Brass & Copper Co., Inc.
WOrth 6-1200
Whitehead Metals, Inc.
WAtkins 4-1500
Rochester
Brace-Mueller-Huntley, Inc.
COngress 6-6560
Metal Supply, Inc. . . . LOcust 2-4260
Sachs Metal Supply Co., FAirview 8-1710
Syracuse
Brace-Mueller-Huntley, Inc.
HOward 3-3341
Whitehead Metals, Inc.
HOward 3-6241

NORTH CAROLINA
Charlotte
Edgcomb Steel Co., FRanklin 5-3361
Greensboro
Edgcomb Steel Co., BRoadway 5-8421

OHIO
Cincinnati
Central Steel and Wire Company
AVon 1-2230
Williams & Co., Inc. . . . CApitol 1-3000
Cleveland
A. M. Castle & Co., Nottingham Steel & Aluminum Division
ATlantic 1-5100
Williams & Co., Inc. . . . UTah 1-5000
Columbus
Williams & Co., Inc., AXminster 4-1623
Dayton
Ohio Metal & Manufacturing Co.
CLearwater 3-4192
Toledo
Williams & Co., Inc., GReenwood 5-8661

OKLAHOMA
Tulsa
Metal Goods Corp. . . . Temple 6-2561

OREGON
Portland
Pacific Metal Co. . . . CApitol 7-0693

PENNSYLVANIA
Philadelphia
Edgcomb Steel Co., GArfield 3-6300
Metal Supply Co., Center 6-0220
Whitehead Metals, Inc.
BAldwin 9-2323
Pittsburgh
Williams & Co., Inc. . . . CEdar 1-8600
York
Edgcomb Steel Co. . . . 47-1411

RHODE ISLAND
Slatersville
Edgcomb Steel of New England, Inc.
POplar 7-0900

SOUTH CAROLINA
Greenville
The J. M. Tull Metal & Supply Co., Inc. . . . CEdar 3-8366

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Metal Goods Corp., WHitehall 8-3407

TEXAS
Dallas
Metal Goods Corp., FLeetwood 1-3271
Houston
Metal Goods Corp. . . Republic 3-5441

UTAH
Salt Lake City
Pacific Metals Company, Ltd.
DAvis 2-3461

WASHINGTON
Seattle
Ducommun Metals & Supply Co.
PArkway 5-1500
Pacific Metal Co. . . . MAin 2-6925

WISCONSIN
Milwaukee
Central Steel and Wire Company
HUmboldt 1-5000
Steel Sales Co. of Wisconsin
HIlltop 2-2020

Aluminum Products Hawaii, Ltd., Honolulu 14, HAWAII

Aluminum Company of America, 937-L Alcoa Building, Pittsburgh 19, Pennsylvania

■ *Big seller for farm building roofing and siding is aluminum cross corrugated roll sheet. Exclusive manufacturer is Quaker State Metals Co., Lancaster, Pa. The picture easily suggests the speed with which this product can be applied. The company is about to introduce an aluminum-polyurethane foam sandwich panel for roofing and siding applications.*

finish, or stucco and leather grain embossed patterns. Exposed panel coverage and panel length vary among these products.

Alcoa feels that most industrial locations dictate the use of alclad aluminum for the most effective resistance to corrosive atmospheres, and so has standardized on this material for all its industrial roofing and siding products. Many government jobs specify alclad, and Kaiser and Reynolds will fill this or any other type of order where alclad is specified.

There has been a growing trend to color for industrial buildings. Alcoa and Reynolds, therefore, offer a wide range of baked alkyd enamel finishes.

Sandwich Walls for Plants

All three producers also promote field assembled insulated sandwich walls which utilize any desired combination of their industrial siding sheets. Generally, glass-fiber insulation is sandwiched between the two layers of sheets, producing a wall measuring as little as 2-¾ inches thick. Insulating qualities of these easily assembled panels are high, giving a U factor of about 0.15, compared with 0.70 granted by 8-inch thick concrete.

Such walls are extremely light in weight, allowing substantial installation economies. A sandwich made up of 8-inch pitch ribbed siding .032-inch thick for the outer skin and .024-inch thick corrugated inner sheet, with a 1-inch fiberglass core weighs less than 1½ pounds per square foot. Screws, bolts, rivets, closure strips and fillers for weatherproofing, and all types of flashing are available.

Since April 1958, Kaiser Aluminum has been making Diamond Rib roofing and siding sheet, a material designed to serve a wide range of building applications—light commercial, farm buildings, and residential, including residential fencing and interior wall uses.

The sheet gets its name from its glare diffusing diamond embossed pattern. Its "flat top" rib configuration, 9/16-inch thick with a pitch of 2.67 inches, is said to give greater strength than other corrugated aluminum covering materials of comparable weight and thickness. Each sheet is about 50 inches wide providing full 48-inch coverage after lapping. Lengths range from six to 16 feet.

A unique "non-siphoning" feature prevents moisture from penetrating side laps after the sheet is installed. Any moisture which starts to gain entry between two sheets at the lap is drained off along a V-crimped channel, preventing further siphoning action. These crimped channels run the full length of one outer edge of each sheet.

Earlier this year Kaiser started producing Diamond Rib sheet in a neutral light green which is achieved by a chemical conversion process. If painting of the sheet is desired, the chemically treated surface serves as a paint base.

"The rugged, well engineered rib configurations in combination with embossing gives the sheet up to 30% greater load bearing strength than heavier gauge .024-inch conventional corrugated or V-crimp aluminum roofing, although it costs less than either," a Kaiser spokesman said. "The configurations add strength in much the same way as cross members of an automobile frame."

Reynolds and Alcoa extend the function of industrial siding by making perforated corrugated sheet. The .024-inch thick material is perforated with 1/8 inch diameter holes on staggered centers, and embossed in stucco or leather-grain pattern. High acoustical properties are given to a sandwich system when this type of sheet is used as the inner facing—a desirable feature for many industrial applications.

Earlier this year Nichols Wire and Aluminum introduced a patterned aluminum roofing and siding sheet called "Lap-Drain." The company reports that the product "has a new ribbed configuration, greater rigidity, lower cost per applied square, much better weathertightness, ease of application and the beauty of a glare-reducing patterned pebble finish.

"It has a better built-in drain trough, a siphon-breaker safety edge which also provides greater rigidity, red nailing line for foolproof nailing, an aligning guide, and an arm-span width."

"Lap-Drain" is produced in lengths from 6 to 12 feet in one-foot increments and in lengths from 14 to 24 feet in two-foot increments—all 32 inches wide.

Brauer Engineering Co. produces a roll formed aluminum panel from .040 x 48 inch wide stock on a machine designed by Walter Brauer. Emerging from the machine, the product is 40 inches wide, and formed in two peaks and three valleys having a 4-inch depth of section.

The panels can be easily sealed inside with any type of dry-wall panel, in which case the aluminum's natural heat reflectivity combines with air space insulation to give an overall insulating

■ *On-site cutting of aluminum siding for this "House of Ease" goes quickly with a power hand saw. The Reynolds program was accelerated this year, will help increase aluminum siding consumption in 1960, even though it probably won't be a good residential building year.*

what are the holes for?

These openings can provide floatation and serve as conduit for heat, coolants, gas, air, fluids, and wiring. Also this material is light, strong, decorative, leak proof, and highly conductive. When you're designing or developing new products consider the possibilities of Roll-Bond. Your inquiry will bring you free preliminary analysis of Roll-Bond in your application and a free illustrated booklet explaining Roll-Bond in more detail. Contact Olin Mathieson today: Metals Division, Roll-Bond Products, East Alton, Ill.

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ROLL-BOND
PRODUCTS

"inflated"
aluminum sheet

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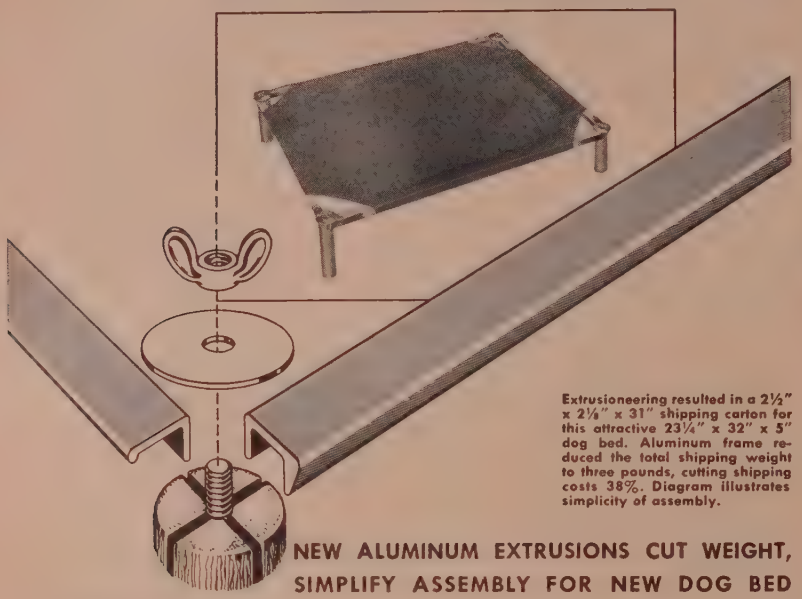
Producers of: Roll-Bond, Western Brass and Olin Aluminum

How PE Extrusioneering

AND SKILLFUL DESIGNING SOLVED NEW PRODUCT PROBLEM



Extrusioneering resulted in a 2½" x 2⅛" x 31" shipping carton for this attractive 23¼" x 32" x 5" dog bed. Aluminum frame reduced the total shipping weight to three pounds, cutting shipping costs 38%. Diagram illustrates simplicity of assembly.

NEW ALUMINUM EXTRUSIONS CUT WEIGHT, SIMPLIFY ASSEMBLY FOR NEW DOG BED

Here is another example of how PE Extrusioneering has helped make possible the profitable production of a new product—this time for Proven Products, Evanston, Illinois, well-known manufacturer of advertising specialties. Original projected costs made the attractive new dog bed impractical. PE Extrusioneering was called into action and special new extruded shapes were developed to meet product requirements.

The new aluminum extrusion resulted in several direct benefits over the original steel frame: (a) elimination of treating and painting expense to resist corrosion; (b) simplified assembly which resulted in a more compact package; (c) reduced weight, and a 38% reduction in shipping costs; (d) a more attractive finished appearance.

Perhaps you can benefit from Extrusioneering, also. Ask for a PE engineer to work with you to help solve problems on your new or revised designs.

PE 5-POINT SERVICE

1. 5,000 STANDARD SHAPES WITHOUT DIE CHARGE—Mill-run service on a wide variety of rods, bars, tubing, and shapes suitable for application in many fields.

2. SPECIAL SHAPES—experienced engineering, design, and die service to help you avoid costly fabricating and assembling problems.

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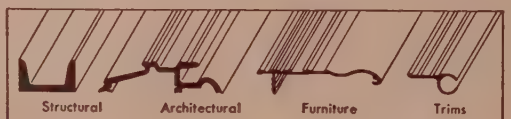
4. COMPLETE FACILITIES—die making, billet casting, various size extrusion presses for efficient production, scientific quality controls, and standard finishing operations.

5. PROMPT PERSONALIZED SERVICE—trained personnel to handle your inquiry and follow through on your order.



WRITE FOR FREE CASE STUDIES

New bulletins, "PE Extrusioneering News," illustrate cost-cutting solutions to various design problems, give helpful technical and fabricating data.

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Chicagoland's Oldest, Most Experienced Aluminum Extruder

■ ***Unique roll formed aluminum panels o Brauer Engineering Co., Ingleside, Texas offer one of the simplest roofing anc siding installations by reason of 4-incl depth of section. Special machine for th work was designed, made and patented by Brauer, produces sections at high speed.***

value comparable to many types of con struction.

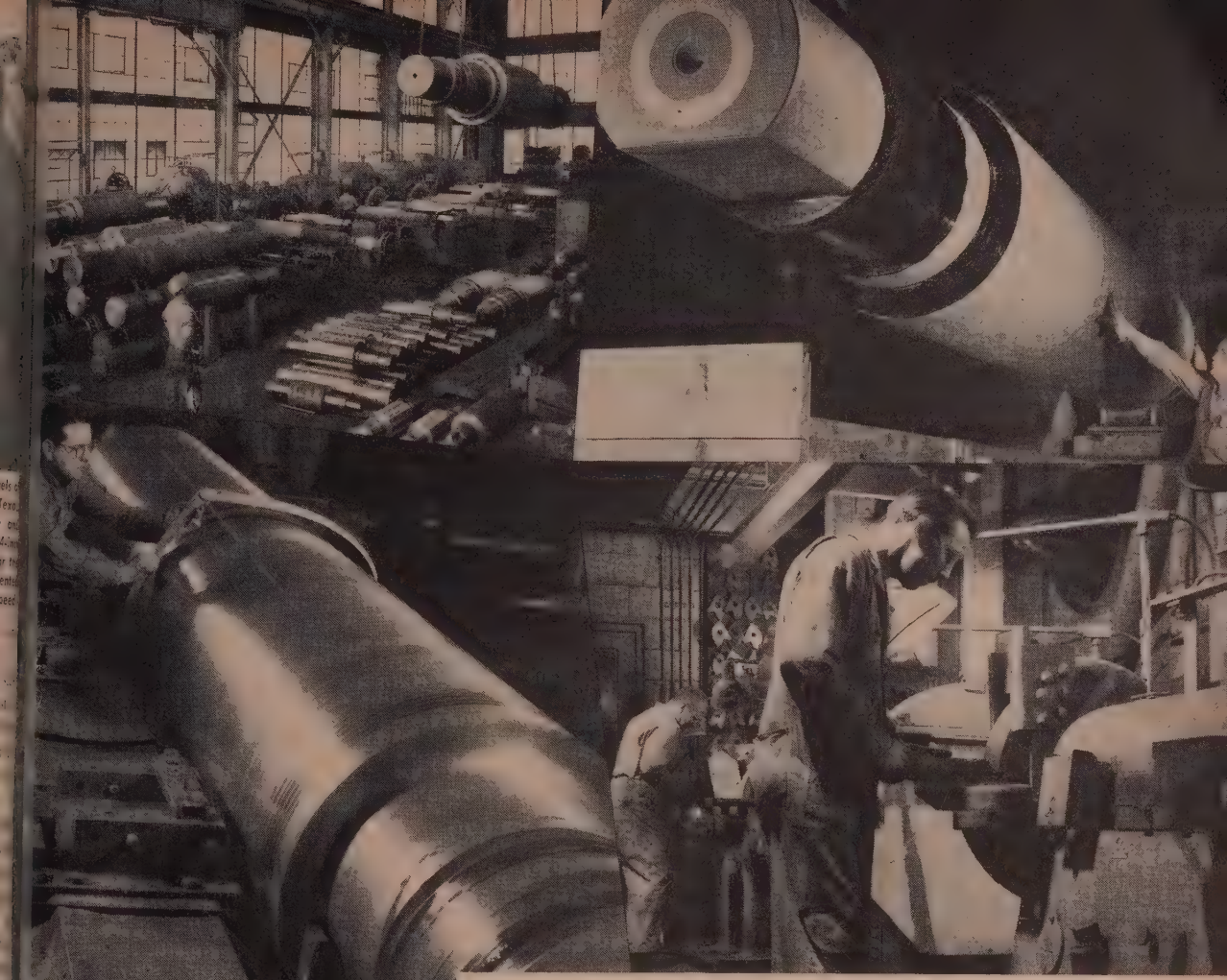
Panel sections are joined at the side laps by aluminum or stainless steel ground head machine screws with hex agon nuts. They are joined to channel members with the same type stainless steel screws in varying lengths.

There is no side lap leakage because the panel's specially grooved edges confine side laps to the top of the panel. These grooved edges and the 4-inch depth of section allow the builder to construct roofs at any pitch, or even perfectly flat, without additional roof covering materials. Water cannot rise to the top of the side lap, Brauer explained. To do so, it would require a rainfall of one inch per minute—three times the maximum rate on record in the U. S.—to fill the panels on a flat roof with only standard eave drains.

"End laps are eliminated and end lap leakage is prevented because the panel is rolled as long as any roof to which it is applied," Brauer pointed out. "The panel has no length limit."

Farm roofing and siding manufactured by Alcoa, Reynolds and Kaiser starts at .016 inch and goes up to .024 inch thick. Two recent additions to Reynolds' farm line are V-beam configuration—one stucco embossed, with a thickness of .019 inch; the other, diamond embossed, .0215 inch thick. Both products feature a "revolutionary" new lapping device (see MM, Oct. '59).

The only source of aluminum cross corrugated roll roofing and siding is Quaker State Metals Co. The material has many advantages for the builder because it can be applied in about half the time as sheet. Side laps are eliminated—no side lap leaks. The product is made in standard widths of 28 and 48 inches, in coils of 50 feet and up.



experience

Alertness to individual operating requirements, coupled with a broad knowledge of rolling practices, is a major part of every Blaw-Knox Roll Engineer's experience.

Behind him is an organization with more than a century's experience in the development and manufacture of rolls.

This experience is your assurance of rolls having the properties, dimensions, and finish for maximum service.

Blaw-Knox Roll Engineers welcome the opportunity to join with you in selecting and applying the rolls best suited to your operating conditions.

BLAW-KNOX COMPANY • Foundry and Mill Machinery Division • 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

EXPANDED anodized aluminum . . . makes light, strong, attractive spandrels for curtain walls

Gray anodized expanded aluminum panels are a major decorative feature of the Time-Life Building, New York's newest skyscraper; establish new approach for aluminum in architectural design.

EXPANDED aluminum has for years found use as decorative details in many types of consumer goods, but its selection to provide a major architectural feature of the Time-Life Building, presently under construction in mid-Manhattan, should give the material increased stature in monumental building.

In this, perhaps the largest single application of expanded aluminum to date, a distinctive pattern is being used to cover the spandrels on the 47-story building. Anodized and colored light gray, the panels provide concealment with an interesting textured design to areas above and below the windows. Exmet Corp., 127 Marbledale Road, Tuckahoe, N. Y., produces the expanded panels from 0.100-inch, No. 20 Anoclad sheet, an Alcoa product, then farms out the anodizing which is done by the Alumilite process.

Aluminum lends itself to forming by the expanding process, resulting in many interesting and useful designs. In this respect, the light metal has greater versatility than most other metals.

"These particular patterns are available in seven different forms," R. L. Hunsicker, an Exmet executive, said. "Variations result from use of different thicknesses of original metal and variations in the amount of metal slit in forming each mesh. This in turn affects the weight per square foot, overall thickness and size of opening."

Expanded metal is manufactured in a vertical press by the use of a serrated upper die that is opposed to a straight lower shearing edge. The upper die, descending, carries with it a strand of metal protruding over the lower shearing edge, but does not descend to the point of separating this strand from the parent piece.

During the upper portion of the stroke the work and the upper die are repositioned so that the points of the serrations on the succeeding stroke enter the metal near the points of attachment left by the prior stroke. Also, during the upper part of the stroke the metal advances by the width of the strand which forms the mesh so that by succession of such strokes a series of joined and wavy strands are formed to make up the final pattern.

Because of this controlled process, expanded metal can be manufactured to give fairly exact specifications as to weight per unit of area, overall thickness and percent of opening.

"The expanding process tilts the aluminum into a three dimensional form and produces a more rigid material than the sheet from which it is made," Hunsicker said. "Because the aluminum is slit and stretched, an equivalent unit area of expanded material generally sells for less than the same unit of raw material. In heavier gauges, expanded aluminum is sold either in sheets or special size panels. In lighter gauges, expanded aluminum is available in coil form."

■ *Expanded, anodized aluminum spandrel cover shown being installed on the new Time-Life Building, New York. Material can also be painted, porcelain enameled.*

Originally, expanded metal was produced only in diamond-shaped pattern. In this respect, Exmet restricts its production to diamond meshes measuring ½-inch down to .021-inch, short way of the diamond. In diamond-shaped patterns, aluminum can be processed from original gauge thicknesses ranging from .002 to .125-inch. Special decorative patterns in aluminum are generally processed in the range of .032 to .125-inch.

For any given mesh size," Hunsicker said, "the mesh width (termed long way of the diamond, LWD) remains constant; the mesh, short way, varies in dimension depending on the degree of expansion."

The Time-Life Building panels are Pattern 1102 (see illustration) which is a non-diamond pattern. According to Hunsicker, Exmet Corp. was the first producer in this field to investigate the possibility of making expanded metal in non-diamond patterns.

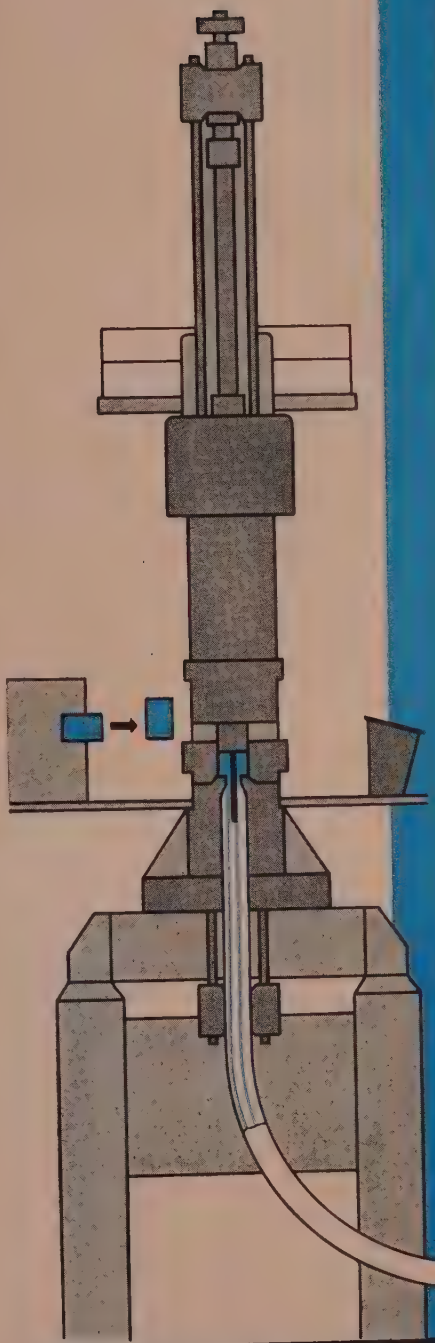
"This was done by making variations on the No. 1 diamond pattern, resulting in such configurations as our No. 1 Texmesh and our No. 1 Ridgemesh," he said. "This has been carried on into many other non-diamond patterns."

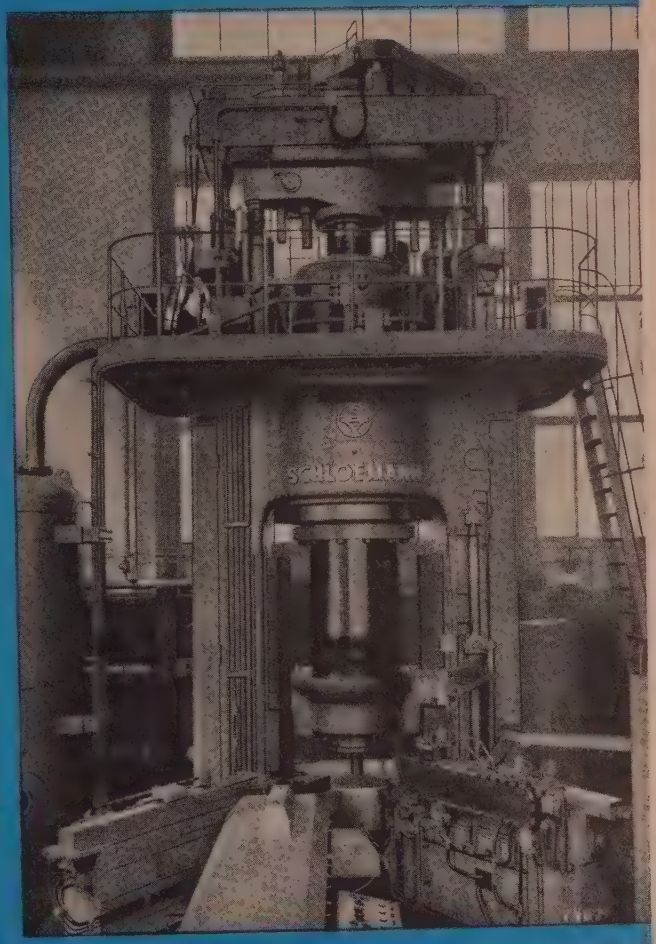
Dimensional limits of expanded metal sheet depend on the size of the mesh desired and perhaps on the thickness of the metal.

"Normally, any of the heavier meshes in the heavier materials (from No. 1 mesh size, .405-inch long way center to center) are manufactured in standard widths 48 inches long way of the dia-

SCHLOEMANN

Extrusion Presses Automated





The fully automatic operating cycle of this vertical 1,375-ton tube and rod extrusion press also includes: billet charging; loading and removing the dummy, as well as the surrounding block; severing the butt, cutting and ejecting the extruded product; cooling mandrel, container and die. Essential features of the press are covered by patents. Only one operator required. 31 vertical SCHLOEMANN extrusion presses equipped for manual or electro-hydraulic automatic control have been built within the past nine years. Latest SCHLOEMANN horizontal extrusion presses also feature fully automatic operating cycle.

FELLER ENGINEERING COMPANY 1165 Empire Building, Pittsburgh 22, Pa.

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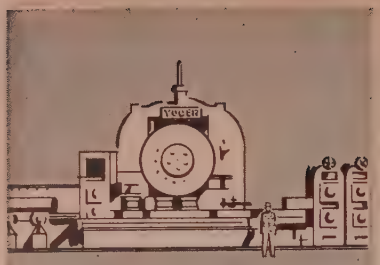

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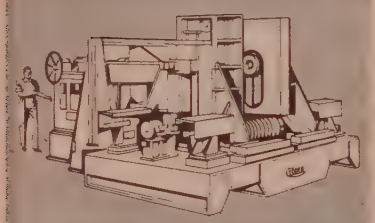
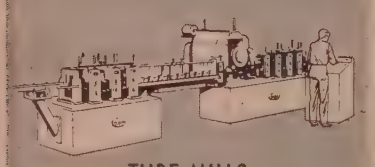

HEAVY DUTY UNCOILERS


TUBE MILLS

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PIPE AND TUBE MILLS
(ferrous or non-ferrous)

mond, although they can generally be produced in a width up to 56 inches," Hunsicker said.

"The short way of the diamond dimension is limited only in theory by the length of the base material. There are, of course, practical considerations, and for the most part, the material is supplied in various lengths from 48 inches up to 96 inches. We have often supplied lengths beyond 96 inches and have, in fact, recently supplied one of our decorative aluminum patterns in various lengths around 10 feet for a curtain wall system on a garage."

The finer meshes and the lighter materials are supplied in narrower widths, Hunsicker said, depending on a number of factors. On the fine meshes the width limitations are shown in the accompanying chart. There is an intermediate range of patterns, primarily the 1/0 and the No. 1, which are made in widths up to 30 inches, long way of the diamond.

Finer Mesh in Coil

The fine expanded metals are generally supplied only in coil form. While supply of the larger meshes in wider widths in coil is impractical, it is entirely possible to coil intermediate sizes, sometimes up to 18 inches wide.

According to Hunsicker, a recent Exmet development was to take pre-anodized coil aluminum, gold color, and then expand the material in the normal manner.

"This provides a contrasting raw edge which in the thinner materials is not readily apparent unless the material is turned and viewed from a sharp angle," he said. "The aluminum can be supplied in the coil form or in finished sizes and means that we are producing a finished grille in attractive anodized aluminum at a much lower cost than would be possible if the material were first expanded and then anodized."

■ *Actual-size picture of No. 1102 expanded aluminum, anodized in gray for use as decorative feature on Time-Life Building.*

Hunsicker said that this practice can be followed to produce expanded aluminum in any anodized color and in a wide range of patterns.

Exmet has worked for many equipment manufacturers supplying grilles for various types of appliances, and for the automotive industry. Exmet also supplies expanded aluminum for many technical applications. The company also produces expanded forms of brass, columbium, copper, gold, lead, molybdenum, nickel, silver, low carbon steel, stainless steel, tantalum, zinc, titanium and magnesium.

Titanium and magnesium have a narrower operating range than aluminum, magnesium being limited to .010-inch maximum thickness.

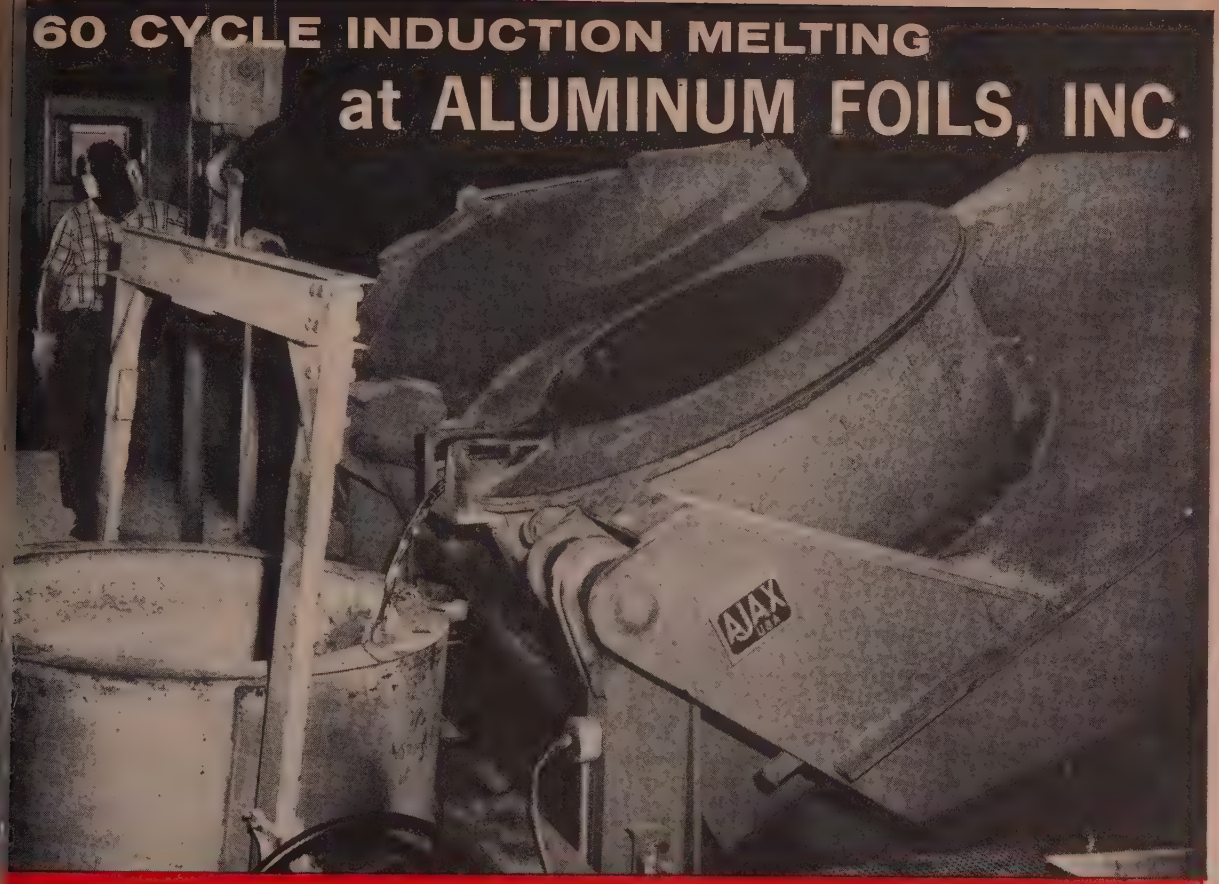
Exmet has recently introduced very fine-mesh expanded aluminum, magnesium, titanium (and other metals) with openings as small as .021-inch and a mesh equal to 50 mesh woven material. It is expected to have many industrial uses.

EXPANDED METAL, FINE MESH

Size Limits

Mesh Designation (Size)	Original Sheet Thickness Min.	Original Sheet Thickness Max.	Strand Width Min.	Strand Width Max.	Max. Sheet Width	Mesh (center-to-center) Dimensions Longway	Shortway Min.	Shortway Max.
#1	.003"	.025"	.007"	.055"	14"	.405"	.20"	.23"
#1/0	.003"	.025"	.007"	.055"	11¾"	.285"	.10"	.125"
#2/0	.003"	.020"	.007"	.035"	11¾"	.1875"	.077"	.091"
#2/0E	.003"	.015"	.007"	.035"	11¾"	.1875"	.048"	.071"
#3/0	.003"	.015"	.003"	.020"	11¾"	.125"	.050"	.065"
#4/0	.003"	.010"	.003"	.020"	6"	.077"	.038"	.046"
#5/0	.003"	.010"	.002"	.011"	6"	.050"	.026"	.030"
#6/0	.002"	.007"	.002"	.009"	5"	.031"	.021"	.024"

60 CYCLE INDUCTION MELTING at ALUMINUM FOILS, INC.



AJAX-JUNKER Coreless 60 Cycle Induction Furnace

Economically Melts Aluminum Foil, Chips, and Sawings.

The 700 kw AJAX-JUNKER coreless induction furnace at the Jackson, Tenn., plant of ALUMINUM FOILS, INC. — specialists in high-quality aluminum foil, coiled sheet, and super-purity aluminum pig — is the largest unit of its type in operation in this country. With a total capacity of 7000 lbs of aluminum, the furnace is capable of melting 3200 lbs per hour.

The AJAX-JUNKER furnace at this company melts plant scrap consisting of foil, scalper chips, and sawings, materials requiring special attention when using conventional furnaces. With the AJAX-JUNKER furnace and its strong inherent stirring action, no labor is required for 'puddling'. One man controls the entire operation.

Average metal losses are below 2% in this installation where experience with other furnace types showed average losses of over 6%. Accurate temperature control, dependability, and uniformity of alloy composition are further features of this unit. ALUMINUM FOILS are also producing hardener alloys directly from plant scrap with a minimum of effort and a maximum of alloy accuracy.

The AJAX-JUNKER 60 cycle induction furnace is an ideal tool for many different applications, melting ferrous and nonferrous metals. Our engineers will be glad to study your melting requirements. Write to AJAX ENGINEERING DIVISION, Trenton 7, N. J., for Bulletin R 58.

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AJAX ENGINEERING DIVISION
P. O. Box 1418 • Lalor & Hancock Streets
Trenton 7, New Jersey

7 GOOD QUESTIONS ABOUT ALUMINUM FORMING . . .

If you have a question about forming aluminum, the chances are your Kaiser Aluminum Distributor can answer it. Experience and metal know-how are as much his stock in trade as top quality aluminum. Use his fund of technical knowledge, backed up by the engineering ability of Kaiser Aluminum's field staff.

Here are the answers Kaiser Aluminum Distributors have given to specific questions about forming aluminum. If you don't see the answer to your questions here, ask *your* Kaiser Aluminum Distributor.

Q. **How can I eliminate fractures in beads made in a closed die in the center of a large sheet of aluminum?**

A. When beads are formed in the center of a large area no drawing in of the metal can take place; therefore, the limit is the elongation of the material. flat bottom on the bead restricts elongation; henc a rounded profile should ease the problem greatl

Q. **Can I bend 2024-T3 plate ¼" thick to a ¼" i side radius?**

A. Any metal, or alloy, depends greatly upon the elo gation of the material at the outside of the radiu to produce a satisfactory bend. A measure of th length of the outside of the bend compared to th neutral axis would show that such a bend in ¼ 2024-T3 is not practical.

A better approach would be to use the recon mended minimum bend radii in the following tabl realizing, of course, that these radii recommend tions are predicated on the use of good tooling.

APPROXIMATE RADII FOR 90° COLD BENDS OF ALUMINUM AND ALUMINUM ALLOY SHEET

(In Terms of Thickness)

These radii represent average values for forming on conventional equipment with tools of good design and condition. The minimum permissible radii a subject to several variables and can only be reliably determined by actual forming under the specific manufacturing conditions.

ALLOY AND TEMPER						SHEET THICKNESS T (INCHES)					
1100	3003	5005	5052	6061	2024	.016	.032	.064	.125	.187	.250
0	0	0	—	—	—	0	0	0	0	0	0
H-12	H-12	H-12	0	0	0	0	0	0	0	0-1T	0-1T
H-14	—	—	—	—	—	0	0	0	0	0-1T	0-1T
—	H-14	H-14	H-32	—	—	0	0	0	0-1T	0-1T	½-1½
H-16	—	—	H-34	—	—	0	0	0-1T	½-1½T	1-2T	1½-3T
—	H-16	H-16	—	T-4	—	0-1T	0-1T	½-1½T	1-2T	1½-3T	2-4T
H-18	—	—	H-36	T-6	—	0-1T	½-1½T	1-2T	1½-3T	2-4T	2-4T
—	H-18	H-18	H-38	—	—	½-1½T	1-2T	1½-3T	2-4T	3-5T	4-6T
—	—	—	—	—	T-3	1½-3T	2-4T	3-5T	4-6T	4-6T	5-7T

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Korhumel Steel & Aluminum Co.

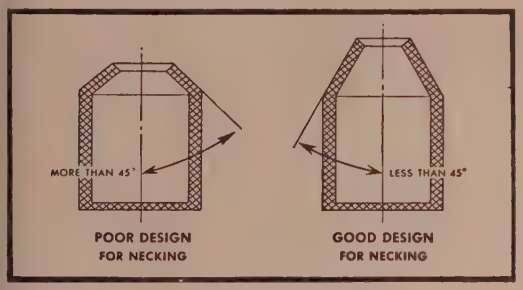
AND 7 GOOD ANSWERS BY KAISER ALUMINUM DISTRIBUTORS

Q. Is tooling for aluminum the same as for steel products?

A. Tools for aluminum must be of better quality than those normally used for steel products. Hardened steel should be used wherever possible in dies and on the tool surfaces that form aluminum. Cast iron tools are not recommended because of surface voids into which the aluminum can be forced, with probable "pick-up" and scratches resulting. A mirror finish on tool surfaces is recommended.

Q. How can I prevent buckling in my roll forming of trim strip?

A. This problem is one of basic tool design and requires the cumulative adding of .010 to .030 to each calculated diameter on each succeeding set of rolls in order to maintain sufficient tension on the strip.



Q. How can I shrink the neck of a drawn sheet without buckling taking place?

A. Reduce the angle between the neck and sidewall to something less than 45°. See drawing above.

Q. Is it possible to anneal aluminum between forming operations?

A. When aluminum has been cold-worked to the point that further work is not practical, it is then possible to partially anneal it before continuing the forming. With aluminum, annealing must be carefully controlled in order to assure adequate workability. It is suggested that we help you work out a fabrication procedure during your planning stage.

Q. What lubricant would you recommend for light forming operations?

A. For simple operations, where heavy pressures are not involved, there are a variety of soluble drawing compounds that can be used. Frequently dry cake paraffin is successful. Keep in mind that mineral oils do not have sufficient slip or lubricity where heavy pressures are necessary. Compounds of vegetable oils or tallows are required.

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FREE BOOKLET. Your Kaiser Aluminum Distributor offers free information and technical data in an informative new booklet, *"Designing With Aluminum."* This helpful manual contains 23 useful articles on how to use aluminum to your best advantage.

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KAISER ALUMINUM

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Cover Converts Swimming Pool to Year 'Round Use

The swimming enthusiast who reluctantly drains his backyard pool for the cold months can turn his favorite sport into a year 'round activity by adding a pool enclosure. International Swimming Pool Corp., White Plains, N. Y., manufacturers of the Esther Williams pools, makes it comparatively easy with the introduction of "Solaroof."

The weathertight shelter is made of heavy aluminum extrusions and layers of translucent polyethylene sheet and saran screening. Designed for two of the Esther Williams line of pools, Solaroof is said to be adaptable to any other pool.

The manufacturer has tested the shelter under heavy simulated snow conditions and low temperatures and reports "excellent performance." Important supplementary equipment is the Esther Williams pool heater.

The manufacturer estimates construction of the Solaroof to take from two to four days, including installation of roof and weatherproofed sides and doors. When summer rolls around again, the polyethylene sections are removed, but the saran screening is left in place, permitting warm weather swimming free from insects.

The basic roof frame is formed by arched, extruded aluminum girders which are bolted onto horizontal extruded members at the sides of the pool structure. The screening and polyethylene covers are then laid over the arches and clamped to the horizontal members by heavy duty nylon cables and eccentric clamps.

New Curtain Wall Aids Architect

A new curtain wall system for multi-story buildings has all the advantages of stock units, yet permits the architect to use it in his own design. Recently introduced by Reynolds Metals Co. and designated the Aluminum Economy Wall System HR202, it is claimed to cut material and labor costs and reduce wall loads.

"In many ways the new wall system is similar to our Economy Wall System 101 which we pioneered in 1958 for one- and two-story buildings," said E. J. Tangredi, director of Reynolds monumental architectural markets. "However, HR202 is designed for high-rise structures—apartments, offices, medical buildings, schools, etc., where Economy Wall 101 can't be used. Now we have a complete Economy Wall system."

Separate windows and pre-framed panels to fit three stock window modules—3 feet, 8 inches; 4 feet, and 4 feet, 4 inches—are standard, the panels offering a choice of porcelain enameled or baked enamel finishes in a wide range of colors. It is possible to coordinate the system with almost any building, Reynolds says.

There is a choice of three standard finishes for the aluminum details: 1. Supplied as an etch and lacquer finish, one found on most windows. 2. An etched, 30-minute anodized and lacquered finish. 3. An etched, 60-minute anodized, and lacquered treatment, providing the most durable finish of the three.

While Reynolds points to the construction economies as the main advantage of the new wall system reason of integration of its eleme other advantages listed by the comp includes the ability to replace exte glazed panels (this is also true of terior glass panels); factory-insta continuous vinyl seals in all ver mullions; integral gutters in the win heads allowing optional use of flash while providing a condensation recei and expansion of buildings achie easily, using the HR202 system, by moving the corner panel and contin with additional units.

Panel thickness is 1⅛ inches hav as one choice, a porcelain ename .063-inch flanged aluminum face v flanged back face of unpainted vanized steel. Core is a 2-pound den fiberglas, full thickness of the pane

There are four modifications of panel, involving porcelain enam steel or aluminum, or mill finished minum for the back face, or an all-s and fiberglas sandwich.

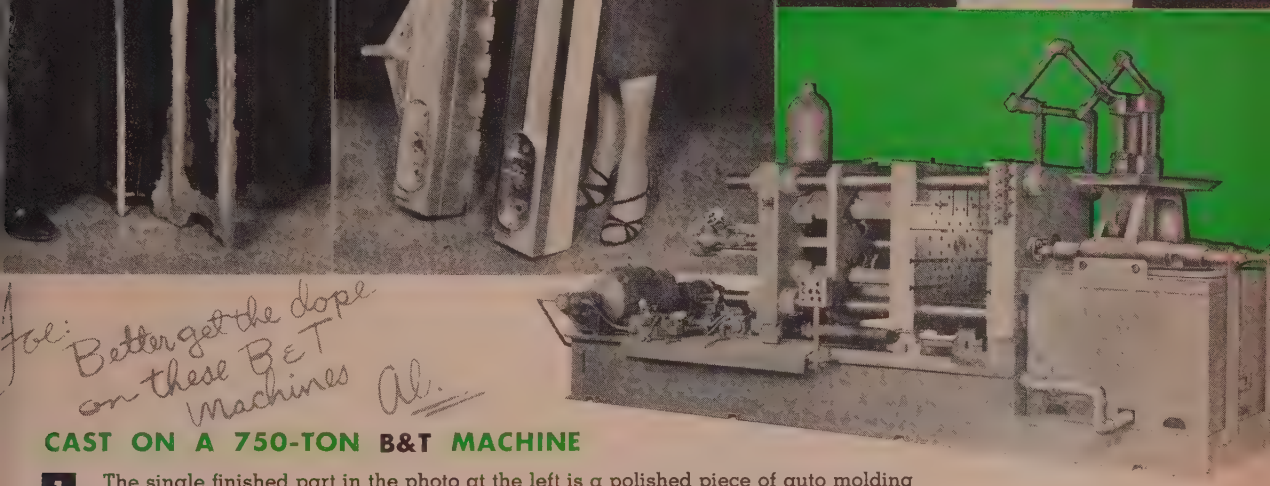
English Canal Spanned by Aluminum Drawbridge

An aluminum canal drawbridge believed to be the first such struc built—recently replaced a 60-year wooden span over the Birmingham/ ford canal at Banbury, England.

About 1,700 pounds of alumi sheet, plate and extrusions in N B51SWP alloy were used. The 10- wide bridge has a clear span of 9 6 inches to concrete abutments. joints are made with aluminum-a rivets and mild-steel bolts.

The bridge was built for the W Department of Banbury Borough Co cil. It was designed by Northern Alu ium Co. to carry the Ministry of Tr port Standard Load. It is fitted v handrails for the safety of pedestr and vehicular traffic, and has been co ter-balanced to remain in the ra position when lifted.

HOLLAND DIE CASTING COMPANY, with skill and experience, produces extraordinary castings on B&T DIE CASTING MACHINES!



Joe: Better get the dope on these B&T machines Al.

CAST ON A 750-TON B&T MACHINE

1 The single finished part in the photo at the left is a polished piece of auto molding trim 64 inches long. It is produced in a two-cavity die weighing more than 8500 lbs. and measuring 84 inches in length. Weight of shot is 10½ lbs. Platens on the B&T machine are 48 inches wide and thus the 84 inch long die actually extends 1½ feet beyond each side of the machine. In successfully holding and casting this long piece the B&T 4-toggle lock-up system forcefully demonstrates its remarkable efficiency.

CAST ON A 750-TON B&T MACHINE

2 This intricate casting is the console of an automatic washing machine. The shot required weighs 14 lbs. Six 5 inch mounting studs in the back of the part are cast independently of the wall. The console has intricate coring and the instrument cluster is chrome plated and painted . . . a difficult casting to produce.

CAST ON A 600-TON B&T DIE CASTING MACHINE

3 This triangular-shaped casting is a chrome plated gravel guard for one of America's finest cars. It is made by the Holland Die Casting Company in a single cavity die weighing more than 6,000 lbs. Weight of the shot is 6½ lbs. Finish obtained is excellent. An outstanding production job for a 600-ton machine and indicative of the remarkable results obtainable with all B&T machines. Holland Die Casting Company's facilities include 12 B&T die casting machines in capacities up to 1,000 tons.

DIE RESEARCH: You are invited to use our Die Casting Research Center for experimentation and furtherance of die casting techniques.

B&T HYDRAULIC DIE CASTINGS TRIM PRESSES are exceedingly fast and efficient. Write for details.

Investigate B&T Die Casting Machines before buying any other. The line includes High-Pressure Cold-Chamber and Hot-Chamber types in capacities of 125, 150, 200,300, 400, 500, 600, 700, 800, and 1,000 tons. Write or phone for complete details.

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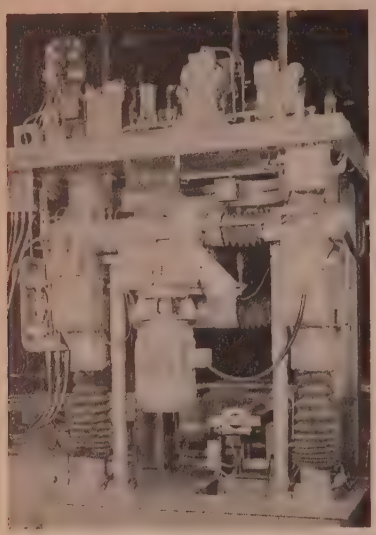
LOMA

CONTINUOUS CASTING MACHINES



FOR THE PRODUCTION OF

- ROLLING MILL SLABS
- EXTRUSION BILLETS
- PIERCING BILLETS
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Improve cast shop operating efficiency and metallurgical product quality with a LOMA fully continuous casting machine. The equipment handles copper in all its various forms — from phosphor de-oxidized and oxygen-free to fire refined and tough pitch. The basic design of the machine also lends itself to the casting of brasses, bronzes, aluminum and magnesium alloys. The shapes produced on the unit include round piercing and extrusion billets, square wire bars and rectangular slabs.

Our standard line of equipment includes:

- Casting Machines and Molds
- Saws and Cut-off Machinery
- Hot and Cold Rolling Mills
- Rod and Tube Draw Benches
- Roller and Stretcher Levellers
- Air and Hydraulic Tube Testers

LOMA
MACHINE MFG. CO., INC.
114 East 32nd Street
New York 16, N. Y.

Harvey Extruding Giant Hollow Sections

A 12,000-ton press at Harvey Aluminum's Torrance, Calif., plant is extruding hollow sections measuring 24.19 by 2.49 inches for the electronics industry - usually noted for its minute components.

Made in alloy 6061, the six-hole shape is fabricated into a modular cabinet assembly component for an electronic control system, and functions both as a container and a supporting member. Outside wall thickness is .250, webs, .250 and end wall thickness, .312.

Originally, the shape was to be assembled from sheet, plate and small extrusions, but it was redesigned as one-piece multiple hollow when it was found that this extruded shape would cut manufacturing costs, eliminate detailed assembly and reduce weight.

Being one-piece, the shape can also as a passage or storage area for control gases, liquids, fuels, etc. Panels can also be designed to interlock.

Super Purity Aluminum Available in Many Forms

Super purity aluminum pig, ingot, billet, coiled sheet, pellets and foil are being produced in substantial quantity by Aluminum Foils, Inc., Jackson, Tenn.

T. W. Allison, sales manager, reports that average purity of these products is 99.996%.

"We also produce super purity aluminum in alloys comparable to common aluminum alloys and having greater structural strength than the pure form," he said.

Companies in the chemical, refining, processing and electrical industries are finding use for super purity aluminum. Due to its unusually high resistance to corrosion, the product is being used in the chemical and processing industries for material handling, storage and heat exchanger applications.

Allison pointed out that the brilliant luster and silvery white color has created growing demand for super purity aluminum in the manufacture of jewelry, eyeglass frames, nameplates, automotive and appliance trim, and hardware. When electrochemically brightened and anodized, super purity aluminum specularity is surpassed only by that of polished silver.

Excellent elongation of the material allows extremely intricate forming such as impact extrusion, eyelets, stamping, deep drawing and spinning. Its ability to flow under pressure expands the limits of intricate shapes and designs which can be produced in aluminum.

Aluminum Foils, Inc. employs an electrolytic refining process developed in Europe to produce its Raffinal super purity aluminum. Alloys of Raffinal which have the same finishing and reflective qualities of Raffinal plus structural strength, have the registered trade name of Reflectal.

Alcan Kingston Works to Have Coating Line

Aluminum Co. of Canada Ltd. will construct a $600,000 continuous coating line to produce painted aluminum sheets and coils at its Kingston, Ontario, sheet mill.

The one-story building is expected to be completed next year. It will produce sheet 48 inches wide, but will have slitting equipment to cut stock to exact customer requirements.

G.E.I. EXTRUDED ALUMINUM SHAPES

ADD BEAUTY . . . UTILITY TO FAMOUS PRODUCTS MANUFACTURED BY

Youngstown Kitchens

Five functional and decorative extruded aluminum parts used in the manufacture of Youngstown Kitchens' Jet-Tower Dishwashers and LO-Line Continuous Counter Tops are produced by General Extrusions, Inc. Needless to say, the most rigid quality requirements are in force.

G.E.I. is geared to accomplish special things in design, close tolerances and quality, rapid production and delivery—most of the time at REGULAR SOLID SHAPE PRICE. G.E.I. engineers are constantly searching for new standards and improvements, new ways to save the customer time, material and money.

GENERAL EXTRUSIONS, INC.
4040 Lake Park Rd. Youngstown, Ohio
SALES OFFICES AT ST. LOUIS, DETROIT, PITTSBURGH CHATTANOOGA, AND CLEVELAND
Consult your classified phone book under Aluminum Products.

GLIDE FOR KITCHEN UNIT DRAWERS
LOWER TUB RAIL FOR DISHWASHER
BASKET RAIL FOR DISHWASHER
UPPER TUB RAIL FOR DISHWASHER
HIGHLY FINISHED BORDER BETWEEN SINK UNIT AND WALL FOR LO-LINE CONTINUOUS COUNTER

Youngstown Kitchens' Jet-Tower Dishwasher is expertly engineered and manufactured with three G.E.I. shapes. The upper tub rails, lower tub rails and basket rails are from G.E.I. Before these shapes could be produced, all consideration had to be given to the fact that these extrusions would be subjected to extreme temperatures, detergents and wear and tear of rollers. G.E.I. came up with highly anodized, completely fabricated and durable shapes to help make Youngstown Kitchens' Jet-Tower Dishwasher a top quality product.

Youngstown Kitchens' new Woodcharm line employs a G.E.I. extrusion as the border between continuous counter and wall. Elegantly anodized, the G.E.I. shape blends in with decorative schemes and acts as buffer between sink unit and wall—resisting food splashes, detergents, etc. Drawers smoothly glide on an aluminum extrusion from G.E.I. Tappan range at far right also uses G.E.I. shapes for beauty and utility purposes.

New Fastener Line Introduced

Brilok nylon stop nuts, which are said to be simultaneously self-tapping, locking, sealing, and insulating, are now being made by Pheoll Manufacturing Co., Inc., 5700 W. Roosevelt Rd., Chicago.

The new nut is a one-piece, washer-faced, resilient hexagon composed of duPont Zytel 101 nylon resin and is molded to American Standard Flats width dimensions, allowing for use of standard installation and removal tools. Brilok nuts are stocked in ivory white but are available in colors for coding, identification, or ornamentation.

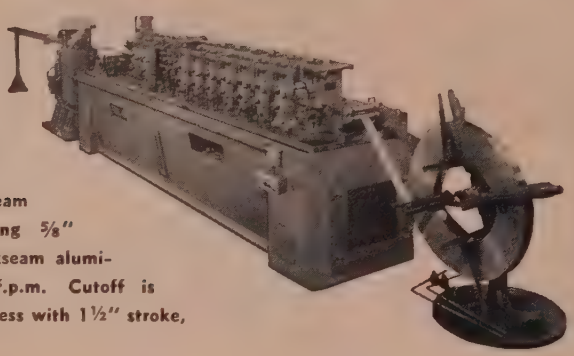
The mechanical, thermal, and electrical properties peculiar to molded duPont Zytel 101 nylon resin make the Brilok nut suitable for use on many types of equipment, including aircraft, automotive, railroad, marine, electronic, chemical, business, medical, photographic, and household.

These stop nuts lock at any position along the shank of the screw, permitting pre-setting. As the screw turns, the resilient material is displaced and a counter-compressive force is exerted against the screw as continuing drive-torque is applied, resulting in a tight friction lock.

Further drive on the bearing surface of the parts to be fastened together causes the cone at the base of the nut to gradually extrude into the clearance

space between the screw and the a jacent walls of the screw hole, providi a seal of the hole against liquid or g escape or entrance of corrosive agen

AMERICAN ROLLER DIE CORP.
ARDCOR
HIGH PRODUCTION ROLL FORMING MACHINE FOR ALUMINUM SHAPES



This Model SF Lock Seam Tube Mill is forming 5/8" O.D., .016" wall lockseam aluminum tube at 120 f.p.m. Cutoff is ARDCOR Model 10 Press with 1½" stroke, 60 strokes per min.

The new small Model SF ARDCOR Machine features: High production speeds; spindles 1.5"; new style rugged base with tool compartment and slanted front recessed for better operator stance; special narrow side roll stands with close 10" horizontal centers; fixed spur gears; quiet running all V-belt drive; low voltage protection. Basic machine readily converted to a Cold Roll Forming Machine.

ARDCOR Roll Forming Machines and Lock Seam Tube Mills are available in seven standard sizes; other sizes to customer specifications.

If your products can be cold roll formed, ARDCOR engineers can supply advancements in design and machine construction to produce them better . . . at greater speeds and profit.

Consult our Engineering Facilities without obligation . . .

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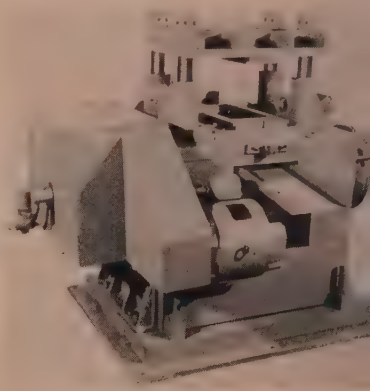
ARDCOR Engineered MEANS BETTER COLD ROLL FORMING

DESIGNERS, ENGINEERS AND BUILDERS: Single Roll Forming Machines or Completely Automated Production Lines for Cold Forming, Ferrous and Non-Ferrous Electric Weld and Lock Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Pinch and Leveller Rolls • Cut-Off Machines • Slitters



New Press For Pre-Notching, Cutting Off

This new press, Model No. 5-D, w recently introduced by Dahlstrom M chine Works, Chicago 41, Ill. It w provide accurate high-speed productio in cutting off or pre-notching rolle formed materials, the company repor

This type of press permits the use coil stock instead of cut lengths, th effecting many economies such as r duction of scrap and production of mo uniform shapes. The compactly d signed unit is available with operatin speed of 300 R.P.M. and in 4 to 120-to capacities. Flag trip or positive mechan cal run-out table can be furnished requirements. Simplified adjustment height and lateral requirement has bee incorporated. Electrical clutch brake furnished on 4 ton units; air clut and air brake on 8 to 120 ton units.

Alcoa Unveils Stereo Hi-Fi in Modern Aluminum Design

Aluminum Co. of America, Pittsburgh, has unveiled its prototype of a stereophonic high fidelity phonograph created out of aluminum in a futuristic design.

Designer Lester Beall created this unique music box keeping in mind the trend toward the component concept of sound system assembly. The Institute of High Fidelity Manufacturers provided Beall with engineering assistance in selecting components for the full-scale prototype.

Beall's Forecast Music Sphere is a three-foot aluminum globe mounted on a tubular shaft. Speaker cones are mounted on top of the globe. The front of the unit is a hemisphere, which rotates exposing the rear portion containing the turntable and amplifier controls.

The creation is not a production item, but will be shown around the country at various shows sponsored by the Institute of High Fidelity Manufacturers.

Glass Beads Broaden Wet Blasting Versatility

Uniformly round glass beads compose most of a wet blasting abrasive that imparts a silvery sheen to work cleaned and finished. The product, Liquasheen, is manufactured by the Techline Division of Wheelabrator Corp., Vicksburg, Mich.

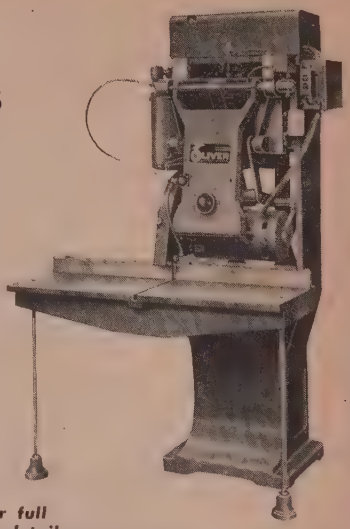
Cleaning properties of the abrasive include low metal removal. The product can be used in wet blasting aluminum, nickel, silver and zinc die castings to remove corrosion, discoloration and fluxes.

The manufacturer says the abrasive is resistant to fingerprinting on nonferrous parts, and to water staining in drying of parts. Resistant to fracturing, Liquasheen has an average blasting time of from 40 to 50 hours.

CUTS EXTRUSIONS DIRECTLY FROM EXTRUDING EQUIPMENT

"OLIVER" No. 94-DHX HYDRAULIC CUT-OFF SAW FOR NON-FERROUS METALS

This is a practical hydraulic Cut-Off Saw designed for cutting aluminum extrusions at a production rate . . . another "Oliver" fine metalworking machine. Excellent cuts are obtained in aluminum, copper, brass and micarta in the form of tubing, solids or extrusions. Features hydraulic stroke and spray mist saw lubrication. Makes cuts up to 12" wide, from 3" to 6" in thickness. Takes 14" to 20" saw. Outstanding safety features. Send for free folder.



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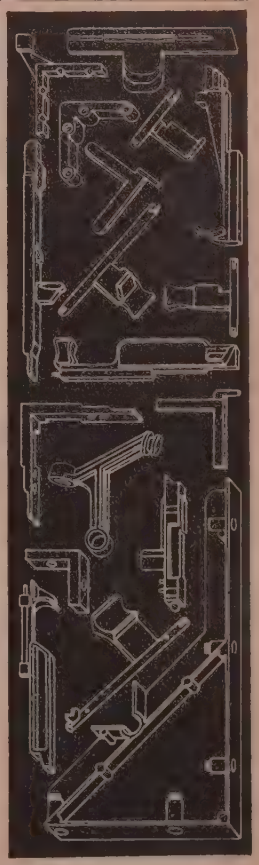

PRODUCT DESIGN ENGINEER WANTED

A growing, progressive company with approximately 400 employees is looking for a Product Design Engineer with experience in the aluminum building products field, especially prime windows. He will report to the Vice President of manufacturing and engineering and must be capable of heading the production design department.

The company is located in a community of 6,000 population in Illinois.

If you have these qualifications and are willing to relocate, send a complete resume' and salary requirements to

Box 1199
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435 N. Michigan Ave., Chicago 11, Ill.

ALUMINUM CASTING SUPERINTENDENT WANTED

Growing diversified company in Northern Indiana lakes region needs experienced, aggressive man to establish and operate new aluminum permanent mold foundry.

Technical and administrative ability essential. Age 30 to 50.

Write full details in first letter to Personnel Manager, The Dalton Foundries, Inc., P. O. Box 110, Warsaw, Ind.

Alumina Base for Ceramic Chamber

Alumina, the powdery white oxide from which metallic aluminum is made, is contributing to a plan to harness the power of the H-Bomb for peaceful pursuits.

Aluminum Co. of America is supplying the material for use in a ceramic chamber, being built to contain a reaction which may achieve temperatures above 100 million degrees Centigrade — five times the temperature of the sun.

The ceramic chamber will form the heart of a device known as the C Stellarator, or "star generator," a term denoting its hoped-for ability to confine solar type energy.

The Stellarator is expected to function by keeping a controlled H-Bomb reaction suspended in a powerful magnetic field within a tube incorporating the alumina-ceramic chamber.

The alumina-bearing Stellarater liner will be in the form of a cylinder 49 inches long and 20 inches diameter. It is the largest ceramic ever produced from what engineers term "high alumina" material — in this case, a patented formula containing 95% aluminum oxide.

Ceramic experts first believed fabrication of the cylinder to be a technical

impossibility, but Frenchtown Porcelai Co., Frenchtown, N. J., drew on i experience as a producer of intricat ceramic shapes and solved all problem In the photo, Tom Macey, president Frenchtown Porcelain, watches as a gia kiln is lowered over the "green" cerami

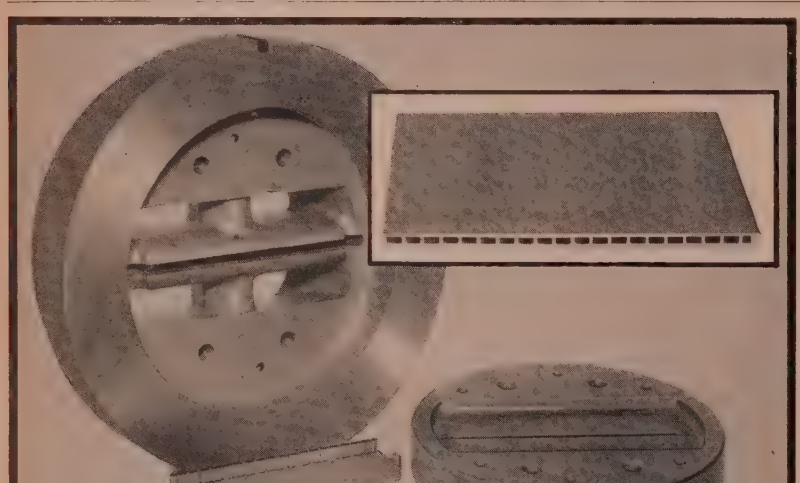
Kaiser Introduces Cast Aluminum Slab

A new product of Kaiser Aluminu is cast aluminum slab for use by in pact extruders and manufacturers electrical systems incorporating alum num bus bar. Kaiser has registered th product under the tradename "K-Slab and has installed equipment for co tinuous casting of the product. Th company also supplies impact extrusio slugs blanked from K-Slab, as well as variety of alloy sheet slugs and slu cut from rod.

"We believe economies gained by u ing K-Slab slugs for impact extrusion will permit impact extruders to ente new markets and produce many ne parts using slugs blanked from th economical new product," said A. Lorch, sales manager of Kaiser's Meta Division. He said that expected growt of the container field and greater us of impacts for industrial parts shoul cause consumption of aluminum amon impact extruders to rise from 40 millio pounds in 1959 to 50 million pound next year.

K-Slab has a thickness range of ⅜ t 2 inches, in widths of 6 to 12 inch and lengths of 12 to 240 inches in th 1100 series of alloys and the highe purity grades.

Casting equipment and the process i which it is used were developed b Kaiser and are covered by patent right of the company. Meanwhile, develop mental work is in progress to expan capabilities of the equipment to othe alloys and on processes permitting cas ing of thicknesses down to ¼-inch.



extrusion dies by mardis!

Shown above: Original MARDIS-designed, liquid passage, 20-mandrel dies used to extrude the 10¼" extrusion (see inset) from a 9" billet! All MARDIS dies are expertly machined to exceptionally close tolerances. Let MARDIS solve **your** next extrusion problem.

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ood-Aluminum Building Meets Revised N. Y. Code

Taking advantage of the recent nges in the New York City building le which now allows the use of fire- istant wood construction, Cross, istin & Ireland Lumber Co. has in- oduced what it believes to be a new ndard of industrial construction ich combines aluminum with the eated wood.

The revised code permits use of the eproofed wood for structural members Class 5 buildings, which are one- ory structures having a maximum of ,000 square feet of floor space. Cross, istin availed itself of the liberalized de with the design shown which fea- res an exterior of ribbed aluminum ding and corrugated aluminum roofing pplied by Alcoa. Front facade of the uilding uses Alcoa's green Alumalure ding. No structural steel is used.

The warehouse will be used to store p to one million board feet of finished nd kiln-dried lumber.

Col. J. Bryan Williams, president of ross, Austin & Ireland, said that an dvantage of the fireproofed wood con- ruction is that practically no mainte- ance is required, and that this was a ajor factor in the choice of the luminum exterior.

Col. Williams also said that the new building is cheaper than conventional buildings, and carries a lower insurance rate. It was built for approximately 10 to 15 cents per square foot less than comparable steel construction, he said.

An advantage of fireproofed structural timbers over steel is that the wood retains its strength under fire conditions. In burning buildings where temperatures of more than 1300° F. are attained, steel usually begins to lose significant strength at temperatures under 1000° F. Treated wood will char at these temperatures, Williams said, but retains nearly all of its strength.

Fireproofing salts are applied to the wood under pressure. The salts are so formulated that heat has the effect of liberating non-inflammable, non-toxic gases which act as a protective blanket and inhibit flame propagation at the surface.

Intensification of the heat causes the salts to decompose, resulting in an absorption of heat which cools and in some cases even extinguishes the igniting flame. Four subsequent reactions, including the creation of char, brought about by application of heat to the fireproofing chemicals prevents combustion.

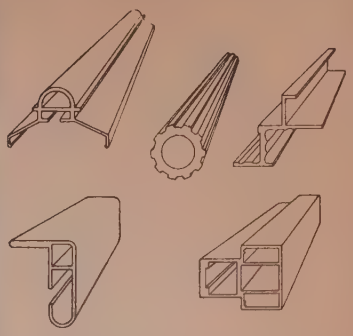
Dow Producing Magnesium Cold-Bending Sheet

Dow Metals Products Co., Division of Dow Chemical Co., Midland, Mich., has made available magnesium cold- bending sheet from coil stock.

The special bending sheet can be used at room temperature providing good cold-bending characteristics. Dow says critical bends can be performed cold, in many cases eliminating need for heated dies.

Either parallel or perpendicular bends to the direction of rolling can be made, and the material will not crack at room temperature even if bent through an angle of 90 degrees around a mandrel radius equal to the bend factor times nominal sheet thickness.

Alloy AZ31B-0 in coil form is used to produce the magnesium bending sheet. Dow said improved coil-rolling techniques are responsible for providing the new sheet. Previously, magnesium cold-bending sheet was produced only on hand mills.



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English Awards to Aluminum Light Standard Designers

The Aluminium Development Association, London, recently awarded four prizes to designers for their entries in an aluminum street lighting column competition.

Chief advantages of the aluminum columns are their light weight, durability and ease of installation. The 25-foot first-prize winner weighs only 94.9 pounds, and it is estimated that three times as many of these poles can be installed in the time it takes to erect a conventional steel and concrete column.

Aluminum street lighting standards are already common in England. Th are generally tapered, though shap vary from octagon to round. Brack arms are placed at or in excess of degrees and plastic lanterns are use Reflectors use high-purity aluminum.

In the picture above, first-prize w awarded for design at left. The designe J. Howe of A. E. I. Lamp and Lightin Co., Ltd., worked in conjunction wi Reynolds T. I. Aluminium Ltd. Secon and third prize designs are shown middle two pictures, with fourth pri being awarded for design at right.

Extruder Starts Conduit Production

Electrical metallic tubing for building construction and renovation applications is being produced by Channel Master Corp., Ellenville, N. Y.

Harold Harris, vice president in charge of sales and engineering, says the new tubing will be priced lower than steel.

The extruded and drawn product is 2/3 lighter than steel, and is non-sparking and non-magnetic. The hard-drawn interior facilitates wire-pulling.

Produced in standard lengths of 10 feet, the tubing comes in six sizes from ½ to 2 inch O. D. The flat shipping bundles have protective end wrappings.

Bendix Acquires English Magnesium Casting License

Bendix Aviation Corp., Teterboro, N. J., has acquired a license granting it the rights to manufacture, use and sell in the United States, magnesium castings produced by Magnesium Elektron Ltd., Manchester, England.

Bendix will be able to use the alloys for casting jet engine compressors, e pansion chambers and gear boxes, ar other equipment for high-performan aircraft.

The license includes the right to u the English firm's alloys of the zircon um rare earth and thorium series, ar a new magnesium-silver-rare earth co bination said to be the strongest magn sium alloy developed.

Coil Color Anodizing Rights Let to U. S. Firm

A color anodized aluminum str developed and manufactured by a We German firm will now be produced the United States by Ano-Coil Corp. its recently completed Rockville, Conn plant.

Metalloxyde Gmbh of Cologne, We Germany, developed the technique an introduced it to the U. S. through Fron son Orban Co., Inc., New York. Th German firm has designed, engineere and built a fully automatic anodizin and dyeing installation for coil produ tion in the U. S.

The strip will be available in a wid range of colors including gold an

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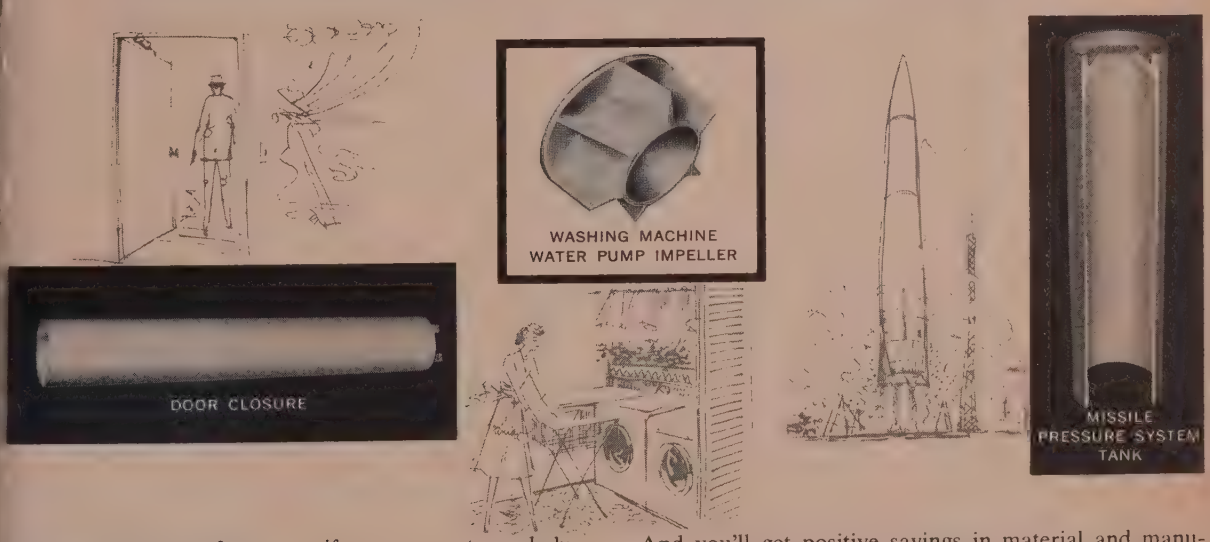

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brass, in gauges from .0025 to .040 inch and in commercial size coil widths from ¾ to 24 inches.

Because of the flexibility of the anodic oxide coating, the strip is suitable for roll and shallow forming. Finishing after fabricating is not necessary.

Financial Briefs

Highly Successful Year Forecast for General Bronze

Record sales for the first nine months this year, buttressed by a single order for aluminum windows from the biggest manufacturer of prefabricated homes, promises to make 1959 an extraordinary year for General Bronze Corp., New York.

As of September 30th, sales exceeded $27 million, compared with $18,436,429 for the same three quarters in '58. For the six months period ending June 30th, earnings equaled $1.39 per common share, while net for the first nine months of '58 equalled $1.01 a share.

The Alwintite Division of General Bronze is filling an order from National Homes for aluminum windows and doors that should amount to between $3.5 and $4 million. The order is for the home manufacturer's 1960 models.

General Bronze also reports orders in excess of $3 million for custom work on new buildings.

Mueller Brass Reports Two-Fold Increase in Earnings

Third quarter earnings of Mueller Brass Co., Port Huron, Mich., were twice that netted for the same period in '58, the company reported.

F. L. Riggin, president, said that the net for the three months ended August 31 amounted to $458,611, or 82 cents a share, from sales of $19.1 million. The same period in 1958 brought earnings of $225,073, or 41 cents a share, from sales of $13.9 million.

Riggin attributed the sales gain to hot weather that boosted sales of air conditioning and refrigeration equipment, inventory building in anticipation of the steel strike, and the continued high level of housing starts.

Sales of $52.7 million during the first nine months ended Aug. 31, netted $1,219,997, or $2.18 a share. For the same period a year ago, earnings were $805,012, or $1.44 a share on sales of $38.3 million.

Ferro Corp. Expects Substantial Sales Gain in '59

Ferro Corp., Cleveland, manufacturer of porcelain enamel frits, expects that sales for 1959 will approximate $63 million, 11.7% higher than the 1958 total. Based on 737,191 common shares outstanding, earnings would approximate $4.50 a share. Last year earnings were $1,986,416, or $2.76 a share on the 719,962 shares then outstanding.

Ferro estimated that sales in the first nine months of this year totaled $47 million, a 17% increase over sales for the same period in '58. Consolidated net income for the first nine months was estimated to be $3.52 a share, compared with $1.77 a share a year ago.

Harry T. Marks, Ferro president, told a group of security analysts who toured Ferro facilities last month that the company is in a strong financial position with a cash flow that obviates the need to borrow "until possibly next March when a short-term loan for tax purposes" may be necessary. Its good cash position has enabled the company to cancel a term loan.

Coast Fabricator Cites Gains, Reports Facilities Expansion

United Pacific Aluminum Corp. earnings for the first six months of 1959, ended September 30, will approximate 43 cents a share, according to Jack J. Bayer, president. This compares with earnings of 38 cents a share in the like period last year based on 463,500 shares.

Net income for the '59 period amounted to a little more than $200,000, compared with $180,698 for the first half of 1958. Sales for the first half of '59 would be slightly in excess of $4.1 million, compared with $3,026,930 for the first six months ended September, 1958.

What had affected 1959 earnings adversely has been start-up costs following installation of a new cold roll mill which has increased UPA's production capacity from 7200 to about 21,000 tons annually, and additional enameling facilities which boost this capacity from 4200 tons to 12,000 tons annually.

Facilities for continuous casting of aluminum coil from pig and scrap are now being installed. In the fiscal year to March 31, UPA had sales of $5.7 million with a net of $278,000.

Calumet & Hecla Net Triples 1958

First half earnings of Calumet & Hecla, Inc., Chicago, were three times greater than those for the same period in 1958, according to Horace Y. Bassett, president.

Consolidated net income for the period was $2,737,701, equal to $1.33 per common share after preferred dividends. This compares with $994,196, or 44c per common share for the same period last year.

First half net sales were $42,516,820, in contrast to $24,881,257 for the first half of '58.

-Foot Aluminum Steeple ses Above Church

Rising 45 feet above the belfry of estminster Presbyterian Church in per St. Clair Township, Pittsburgh, a new porcelain enameled aluminum eple composed of nearly 400 panels. ngram-Richardson Mfg. Co., Beaver lls, Pa., produced and erected the eple by attaching the panels with uminum clips and screws to an octa- n-shaped wooden framework. Top- ng the steeple is a one-piece hood of uminum and an 8-ft. gold finished uminum cross.

A special design limited the shapes panels to four. However, because of e ever-narrowing area of the cone- aped steeple, no more than four pan- s of any shape are the same size. orcelain enameled aluminum cover rips separate each panel.

luminum Bus Bars ilver-Plated in 3-Steps

Allis-Chalmers Research Laboratories, filwaukee, has developed a new three- ep process for silver coating aluminum us bars more conveniently than cop- er.

In order to free aluminum of a cling- ng, natural coating, present commercial lating processes require up to eight eps.

After routine degreasing, the new hree-step method includes: alkaline ip, mercuric compound bath, silver lating. The new type mercuric com- ound bath is expected to be able to e applied in conventional plating hops.

With the new process, plating can be onfined to the areas where it will do he most good. Also, aluminum plated with the new method retains its elec- rical properties at higher temperatures han aluminum processed in the pres- nt manner.

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Looking Ahead

Aluminum in building and construction is the theme of this issue. As noted on the cover, aluminum consumption in the building field has jumped from less than 300 million pounds in 1947 to over a half-million tons this year. We predict a further increase of 200,000 tons next year. The estimate isn't ours alone. All major aluminum firms are pretty much in agreement.

Aluminum building product manufacturers predict a comparable increase – somewhere between 20 to 30% over 1959 – according to replies to a small survey we made this month among 1000 small and medium-sized aluminum building product manufacturers. Nearly half of them plan to add a new wing to the existing plant or build a new one, and many of them will buy new equipment – billet casting facilities, extrusion presses, anodizing equipment, and roll forming machinery, etc. Fully a third of those who replied have a new aluminum product or two they plan to introduce in 1960.

These firms are much more bullish than we expected, in view of the grim talk of no steel until January, tight mortgage money, more layoffs to come, etc. While we recognize that a thousand plants is only a spot check these days, it's hard to get away from the notion that the small fellow has a keener eye and ear for the business weather than his bigger brother. Our circulation list contains about 7000 firms that make aluminum products for the building industry. If they sold an additional 25% next year, they could almost bring on an aluminum shortage.

So much is developing in the building field today that it was almost too easy to devote this issue to the single subject. The widespread introduction and volume application of aluminum in this industry during the past decade has revolutionized building. And it's contagious. Visitors from England, Germany, France, Australia, etc., used to ask us: "This aluminum fad in building won't really last, will it?" Today those countries are using more aluminum in building products than their aluminum experts expected to see in their lifetimes. We've devoted a section to aluminum curtainwall developments in Britain – and they are making good progress. This, say some Britishers, is like seeing coffee move in on tea as the national hot drink over there.

It is now easy to see a million tons of aluminum a year being consumed by the building industry in the early sixties in this country. If a few dream-type projects are realized, it could hit two million tons within ten years. And should the rest of the world – particularly Russia and Europe – follow proportionately, building and construction alone could handily consume 4 million tons (current annual world aluminum output) before 1970. This could pose quite a problem for primary aluminum producers; might even cause other basic materials manufacturers to decide that aluminum is something they should also be producing.

Aluminum producers are only a step away from getting into the building business, some say. While they're now as close to the biggest builder (National Homes) as a supplier can get, the gossip is not true – yet. It takes a tremendous amount of money to finance housing projects and native know-how to organize materials delivery for quick, economical construction. Big problem is how to get the product out of a plant quickly, efficiently and as specified. If the potential in the building field continues to spiral the aluminum producers will get closer than ever to the building industry. Aluminum is revolutionizing the industry, so be prepared for some shockers in the early sixties. If you can anticipate them, you'll wind up owning a bank and the city it's located in.

The steel strike won't be forgotten by steel employees for years to come. As they pay off their debts, they may well pin the blame on David McDonald – not because he wasn't out to get all he could for them, but because he wanted to deal with the top brass among the steel companies. He disliked having discussions with second-rate, second team men, and he got sore. He had a point – but what about those chief executives of the steel companies? It's hard to recoup "basic principles" in one year when you let labor bosses call all the shots for about ten. Steel companies should have gotten tough about 1952, instead of waiting until output and profits were the highest in history.

Aluminum producers may learn a lesson here. If featherbedding isn't the big issue among aluminum producers, then the problem is one of settling for the minimum wage increase. Trade magazines and newspapers say the aluminum industry is waiting for Kaiser Aluminum to settle first. Rubbish! The plain facts are that this amateur drama between steel and union may resume after the 80-day "cooling off period." Then the real damage gets underway. If steel goes out again, the aluminum industry is in for a real slump. If there's a chance to settle on modest terms, the time to do it is now. It might set the pattern for all industry. Why be a follower?

– The Editors

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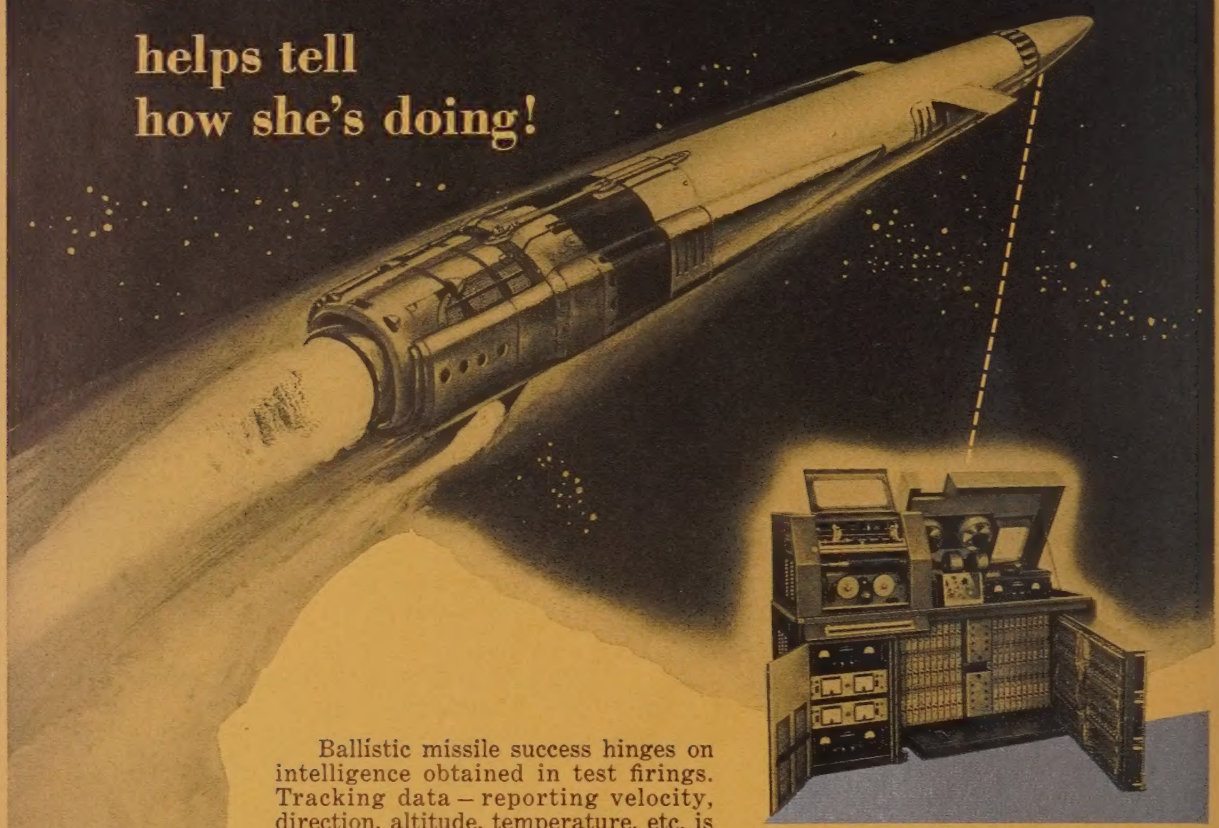

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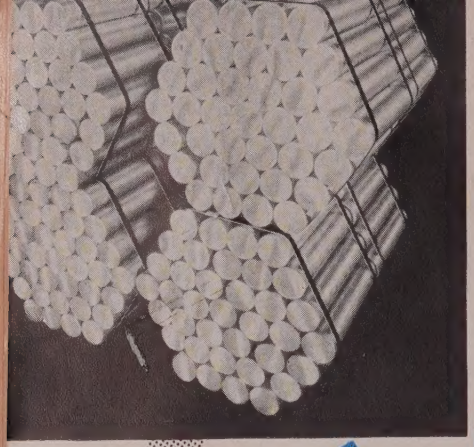

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